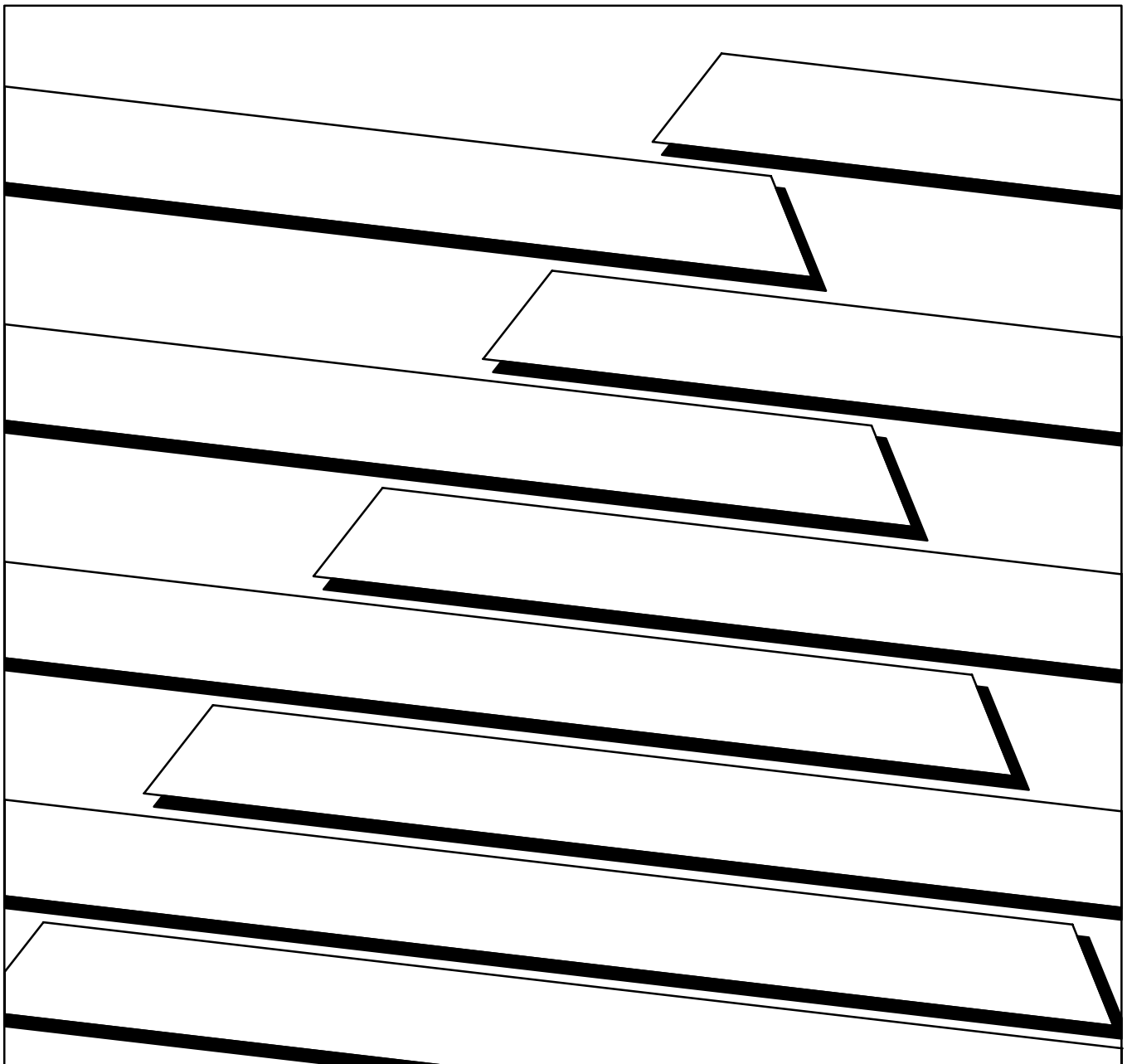




ALLEN-BRADLEY

Pyramid Integrator

Installation Manual



Important User Information

Because of the variety of uses for the products described in this publication, those responsible for the application and use of this control equipment must satisfy themselves that all necessary steps have been taken to assure that each application and use meets all performance and safety requirements, including any applicable laws, regulations, codes and standards.

The illustrations, charts, sample programs and layout examples shown in this guide are intended solely for purposes of example. Since there are many variables and requirements associated with any particular installation, Allen-Bradley does not assume responsibility or liability (to include intellectual property liability) for actual use based upon the examples shown in this publication.

Allen-Bradley publication SGI-1.1, *Safety Guidelines for the Application, Installation, and Maintenance of Solid State Control* (available from your local Allen-Bradley office), describes some important differences between solid-state equipment and electromechanical devices that should be taken into consideration when applying products such as those described in this publication.

Reproduction of the contents of this copyrighted publication, in whole or in part, without written permission of Allen-Bradley Company, Inc., is prohibited.

Throughout this manual we use notes to make you aware of safety considerations:



ATTENTION: Identifies information about practices or circumstances that can lead to personal injury or death, property damage or economic loss.

Attention statements help you to:

- identify a hazard
- avoid the hazard
- recognize the consequences

Important: Identifies information that is critical for successful application and understanding of the product.

Summary of Changes

Additional Information

In general, we improved the format and added greater detail to this manual. The table below lists specific changes we made:

We have:	To chapter/appendix:
added and updated drawings for the chassis, I/O scanner (RS5), power supply module, Color CVIM module, CVIM2 module, User Interface box (2801-N26), I/O interface box (2801-N27) and camera (2801-YE)	1
updated the "Rack Mount the Components" and "Mount the Fan Assembly" procedures	2
updated the drawing for grounding the components	3
updated the installation procedures for: - power supply - RS (added steps for RS5) "Replace a MicroVAX Information Processor" We have also combined the installation procedures for RM and KA module into one procedure	4
replaced information on industrial disk 5710-ID4 and -ID5 with 5710-ID6 and -ID7	5
added the information on configuring the extended-local I/O adapter module	7
updated these procedures: "Connecting Remote I/O to the RS" "Connecting the Extended-local I/O link" "Connecting to a PanelView Operator Terminal"	9
updated the power supply information	10
updated the procedure on "Checking the PI modules" and added new information for RS5	11
combined the chapters on MicroVAX Information Processor and MicroVAX Information Processor EE or EP into one chapter and added the "Verify and Format Disk for 5730-CPU1" section	12
updated the installing and removing PI modules sections	A
added dimensions information for the new user interface box (2801-N26), I/O interface box (2801-N27) and camera (2801-YE)	B
added flowcharts for RS5	D

To help you find new or updated information in this release of the manual, we have included change bars as shown to the left of this paragraph.

Table of Contents

Summary of Changes	<u>-i</u>
Additional Information	<u>-i</u>
 Using this Manual	 <u>iii</u>
Manual Objectives	<u>iii</u>
Pyramid Integrator Documentation	<u>iii</u>
Who Should Use this Manual	<u>iv</u>
Related Publications	<u>v</u>
Terms and Conventions	<u>v</u>
 Preparing for Installation	 <u>1-1</u>
Chapter Objectives	<u>1-1</u>
To Prepare for Installation	<u>1-1</u>
Gather the Documentation	<u>1-1</u>
Hardware Availability	<u>1-2</u>
Unpack the Hardware	<u>1-2</u>
Identify the Hardware	<u>1-3</u>
Module Weights	<u>1-10</u>
What to do Next	<u>1-10</u>
 Mounting the Components	 <u>2-1</u>
Chapter Objectives	<u>2-1</u>
To Mount the System Components	<u>2-1</u>
Gather the Mounting Documentation	<u>2-1</u>
Gather the PI Components	<u>2-1</u>
Gather the Tools and Supplies	<u>2-2</u>
Rack Mount the Components	<u>2-2</u>
Panel Mount the Components	<u>2-5</u>
Mount the Fan Assembly	<u>2-8</u>
Mount the Camera	<u>2-10</u>
Mounting a Black and White Monitor (2801-N6,-N9,-N20)	<u>2-11</u>
Mounting the I/O Board 1771-JMB	<u>2-11</u>
What to do Next	<u>2-12</u>

Grounding the Components	3-1
Chapter Objectives	3-1
To Ground the Components	3-1
Gather the Grounding Documentation	3-1
Gather the Necessary Tools and Supplies	3-1
Ground the Components	3-2
What to do Next	3-4
 Installing the Modules	 4-1
Chapter Objectives	4-1
How to Use this Chapter	4-1
Help to Prevent Electrostatic Damage	4-1
Lithium Battery Information	4-1
Gather the Module Documentation	4-4
Power Supply	4-5
RM/KA Module	4-8
RS Module	4-15
LP Module	4-18
Vision Processor Modules	4-20
MicroVAX Information Processors	4-21
EI Module	4-24
OSI Carrierband/Broadband Interface Module	4-26
Configuring the PI OSI Interface Module	4-31
OSI Interface	4-32
 Installing the Peripherals	 5-1
Chapter Objectives	5-1
Where to Begin	5-1
Install a Programming Terminal	5-1
Install the Industrial Disk	5-2
Install the 4-Port Distribution Panel	5-9
Install the Program Loader	5-9
What to do Next	5-10
 Installing the Vision Components	 6-1
Chapter Objectives	6-1
Installing the Vision System	6-1
Before You Begin	6-1
Connect the I/O Interface Box	6-2
Connect the User Interface Box	6-3
Connect the Camera to the CVIM Module	6-5
Connect the I/O Board	6-6
Connect to Remote I/O Link	6-7
What to do Next	6-7

Installing 1771 I/O	7-1
Chapter Objectives	7-1
What You Should Have Completed	7-1
Before You Begin	7-1
Set I/O Chassis Switches	7-2
Set the I/O Chassis Configuration Jumper	7-3
Set I/O Adapter Module Switches	7-3
Configure the Extended-Local I/O Adapter Module	7-7
Set 1771-AM1, -AM2 I/O Chassis/Adapter Switches	7-10
Install Keying Bands	7-11
Installing and Wiring I/O Modules	7-12
Connecting Shielded Cables	7-17
Connecting I/O Power Supplies	7-19
What to do Next	7-19
 Installing Non-standard I/O	 8-1
Chapter Objectives	8-1
Setting Direct Communication Module Switches	8-1
Setting PLC Interface Module Switches	8-3
Setting 1785 PLC-5 Processor Switches	8-4
Setting RediPANEL Push-button Module Switches	8-6
Setting RediPANEL Keypad Module Switches	8-6
What to do Next	8-6
 Connecting the I/O Link	 9-1
Chapter Objectives	9-1
Connecting the Remote I/O Link	9-1
Connecting the Extended-Local I/O Link on the RS5 Modules	9-5
Connecting to a 1771-AM1, -AM2 I/O Chassis with Integral Power Supply and Adapter	9-7
Connecting to a 1785 PLC-5 Controller	9-7
Connecting to a Direct Communication Module	9-8
Connecting to a RediPANEL Module	9-8
Connecting to a PLC Interface Module	9-9
Connecting to a PanelView Operator Terminal	9-10
What to do Next	9-10

Connecting ac Power	10-1
Chapter Objectives	10-1
What You Will Be Doing	10-1
Gather ac Wiring Documentation	10-1
Disable Inputs and Outputs	10-2
Power Supply	10-2
Industrial Disk	10-3
Fan Assembly	10-4
Connecting I/O Power Supplies	10-4
 Checking the Hardware	 11-1
Chapter Objectives	11-1
Checking the Hardware	11-1
Disable All Inputs and Outputs	11-1
Perform Standalone Hardware Check	11-2
Check the PI Modules	11-3
Check I/O	11-7
Check Vision Components	11-8
Check Peripherals	11-9
What to do Next	11-11
 Configuring Hardware for the MicroVAX	
Information Processors	12-1
Chapter Objectives	12-1
Gather Your Equipment	12-1
Start Up and Test MicroVAX Information Processor Hardware	12-1
Verify and Format Disk (for 5730-CPU1)	12-12
Formatting the Industrial Disk (for 5731-CPU1, -CPU2)	12-16
Set Hardware Defaults	12-17
What to do Next	12-18
 Installing and Removing a Module	 A-1
What's in this Appendix	A-1
Changing a Memory Module	A-1
Installing a PI Module in the Chassis	A-5
Removing a PI Module from the Chassis	A-8
Installing Filler Plates	A-10
How to Wire a Connector	A-11
 Mounting Dimensions	 B-1
What's in this Appendix	B-1

Cable Connections for the RM and KA Module	C-1
What's in this Appendix	C-1
Switch Settings	C-2
Cable Connections	C-3
Cable Pinouts	C-4
 Start Up and Configure the Modules	 D-1
What's in this Appendix	D-1
 Figures/Tables	
Figure 9.4	
Make Extended-Local I/O Connections	9-6
Table 7.A	
Switch Settings for Available Starting Extended-local I/O	
rack Numbers	7-8
Table 7.B	
Extended-Local I/O Adapter Switch Settings, First I/O	
Group Number	7-9

Using this Manual

Manual Objectives

Read this manual to learn how to install the Pyramid Integrator™ hardware.

Pyramid Integrator Documentation

Use this manual with the *Pyramid Integrator Design Manual* (5000-6.2.10).

We assume that you are familiar with:

- basic cabling
- wiring
- grounding procedures
- programmable controllers

For more information, see the *Programmable Controller Wiring and Grounding Guidelines* (1770-4.1).

Who Should Use this Manual

Use this manual if you are installing any of the following hardware:

Modules:	Cat. no.:
power supply	5120-P1/B
resource manager	5130-RM1,-RM2
remote scanner	5150-RS2, -RS5
logic processor	5250-LP1/B, -LP2/B, -LP3/B, -LP4/B
MicroVAX [®] Information Processor module EP	5731-CPU1
MicroVAX Information Processor module EE	5731-CPU2
MicroVAX Information Processor module	5730-CPU1
Ethernet [™] interface module	5820-EI/A
vision processor	5370-CVIM, -CVIM2, -CVIMC
DH/DH+ [™] interface module (KA module)	5130-KA
OSI interface module	
carrierband	5820-CC
broadband	5820-CBA, -CBB, -CBC
Chassis:	Cat. no.:
4-slot chassis	5110-A4/B
8-slot chassis	5110-A8/B
fan assembly	5110-FAN8
Peripherals:	Cat. no.:
4-port distribution panel	5710-DPI
159 Mbyte industrial disk	5730-ID3
209, 418, or 480 Mbyte industrial disk	5710-ID4, -ID5, -ID6, -ID7
program loader	5710-PL/B
Vision components:	Cat. no.:
user interface box	2801-N22, -N26
I/O interface box	2801-N21, -N27
rack mount color monitor	2801-N8
black and white monitor	2801-N6,-N9, -N20
camera	2801-YB, -YC, -YD, -YE
I/O board	1771-JMB
Other components:	Cat. no.:
I/O chassis	1771-A1-A2,-A4, -A1B, -A2B, -A3B, -A4B
I/O power supply	1771-P2,-P4,-P7

Related Publications

For additional information on topics related to the PI system, see these publications:

Publication:	Catalog No. / Publication No.:
Allen-Bradley Data Highway Cable Layout Manual	1770-6.2.1
Pyramid Integrator System Design Manual	5000-6.2.1
CVIM User Manual	5370-ND001
CVIM Communications Manual	5370-ND002
CVIM Quick-Start Self-Training Guide	5370-ND003
INTERCHANGE Software for PI MicroVAX Documentation Set	5730-DTLD
Pyramid Integrator OSI Interface Software User's Manual	5820-6.5.1
INTERCHANGE Software for VMS Documentation Set	5830-VDOC
INTERCHANGE Software for HP-UX (Ethernet) Documentation Set	5840-HPUD
PLC-5/250 Programming Software Documentation Set	6200-N8.002
Allen-Bradley MAP Station Manager Software User's Manual	6630-6.5.2

If your system includes a 1785 PLC-5 programmable controller, see *PLC-5 Family Programmable Controllers Hardware Installation Manual* (1785-6.6.1).

Terms and Conventions

In this manual, we use the following terms and conventions:

We refer to the:	As the:
Data Highway link	DH link
Data Highway Plus™ link	DH+ link
Resource manager module	RM
Logic processor module	LP
Remote scanner 5150-RS2 and -RS5 modules	RS. Unless noted otherwise, RS denotes both modules.
Ethernet™ interface module	EI
Configurable vision input module	CVIM™ module or vision processor
Data Highway/Data Highway Plus interface module	KA module
Open Systems Interconnect module	OSI interface module or Cx module
MicroVAX Information Processor, MicroVAX Information Processor EP, and MicroVAX Information Processor EE	MicroVAX information processors
MicroVAX Information Processor with expanded processor (16 Mbytes)	MicroVAX information processor EP
MicroVAX Information Processor with expanded processor (32 Mbytes)	MicroVAX information processor EE
Pyramid Integrator system	PI system

When we refer to words of memory in PI modules, we mean 16-bit words unless otherwise stated.

In addition, you may encounter words in different typefaces. We use these conventions to help differentiate descriptive information from information that you enter while programming your PI system.

- Words or commands that you enter appear in boldface. For example:

TEST 50

- Messages or prompts on the screen look like this:

PV_SCS_FMT_CHN (0=SCSIA \ 1 = SCSIB)?

- “Enter” means — type in the information and then press the **[Return]** key.

Preparing for Installation

Chapter Objectives

This chapter lists the tasks that must be completed before you install the hardware.

To Prepare for Installation

To prepare for installation, complete the following:

- gather the documentation from your system designer
- make sure the hardware is available
- unpack the hardware
- identify the hardware

Gather the Documentation

While designing your system, your system designer completes documentation that describes what to install and how. Gather the documentation from your system designer. You will use this documentation with the procedures in this manual to install the hardware.

If you are installing I/O, make sure you have the installation information for each type of I/O you are installing.

You may have only some of the documentation below because you may not be installing some of the components.

Get this information from your system designer:	In chapter:	To:
list of the components you will install	1	identify components
the position of the components	2	mount components
the points to ground	3	ground components
the PI modules you install, switch settings, and connections	4 and appendix A	install modules
other PI components you will install (industrial disk)	5	install peripherals
vision system information	6	install vision components
standard 1771 I/O	7	install standard 1771 I/O
non-standard 1771 I/O	8	install non-standard 1771 I/O
I/O points to wire	9	wire I/O link
ac wiring diagrams	10	connect ac power

Hardware Availability

Using the list of hardware supplied by your system designer, make sure all the listed hardware is available.

Check the invoice to make sure that the catalog numbers on the boxes match the hardware that's on your hardware list.

If the hardware is:	Then:
not available	check with your system designer to see if something has changed.
available	continue to the next section.

Unpack the Hardware

Some of the PI modules are packaged in bags to help protect them from electrostatic damage. When you see this bag, provide a static-safe environment when:

- taking the module out of the bag
- setting jumpers inside the module
- placing the side panel on the module

As a minimum, we recommend the 3M Type 8005 Portable Field Service Grounding Kit or its equivalent for providing a static safe environment.



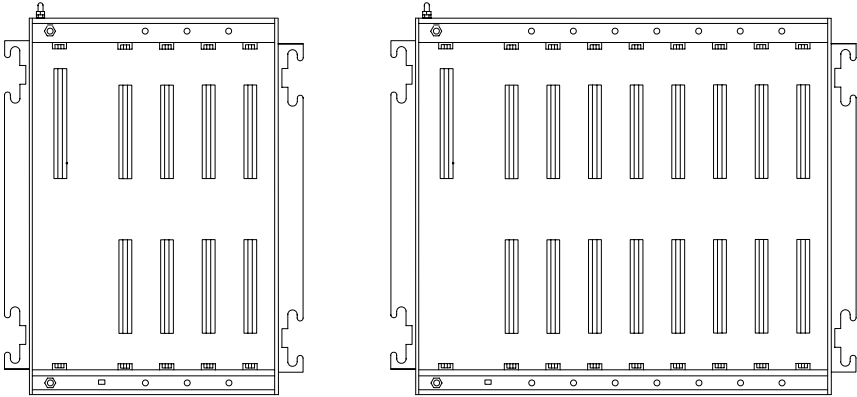
ATTENTION: If you perform operations on a module improperly, you may cause an electrostatic discharge, which can damage the module. Perform internal operations, such as setting the jumpers, only in a static safe environment.

For further information, see the application data, *Guarding Against ESD Application Note* (ICCG-4.3).

Identify the Hardware

After you unpack the hardware, use the figures below to help identify the components.

Figure 1.1
Chassis

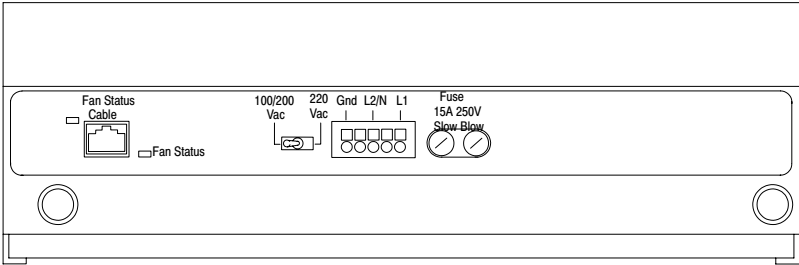


4-slot chassis (5110-A4/B)

8-slot chassis (5110-A8/B)

19775

Figure 1.2
Fan Assembly



Fan assembly (5110-FAN8)

16725

Figure 1.3
Modules

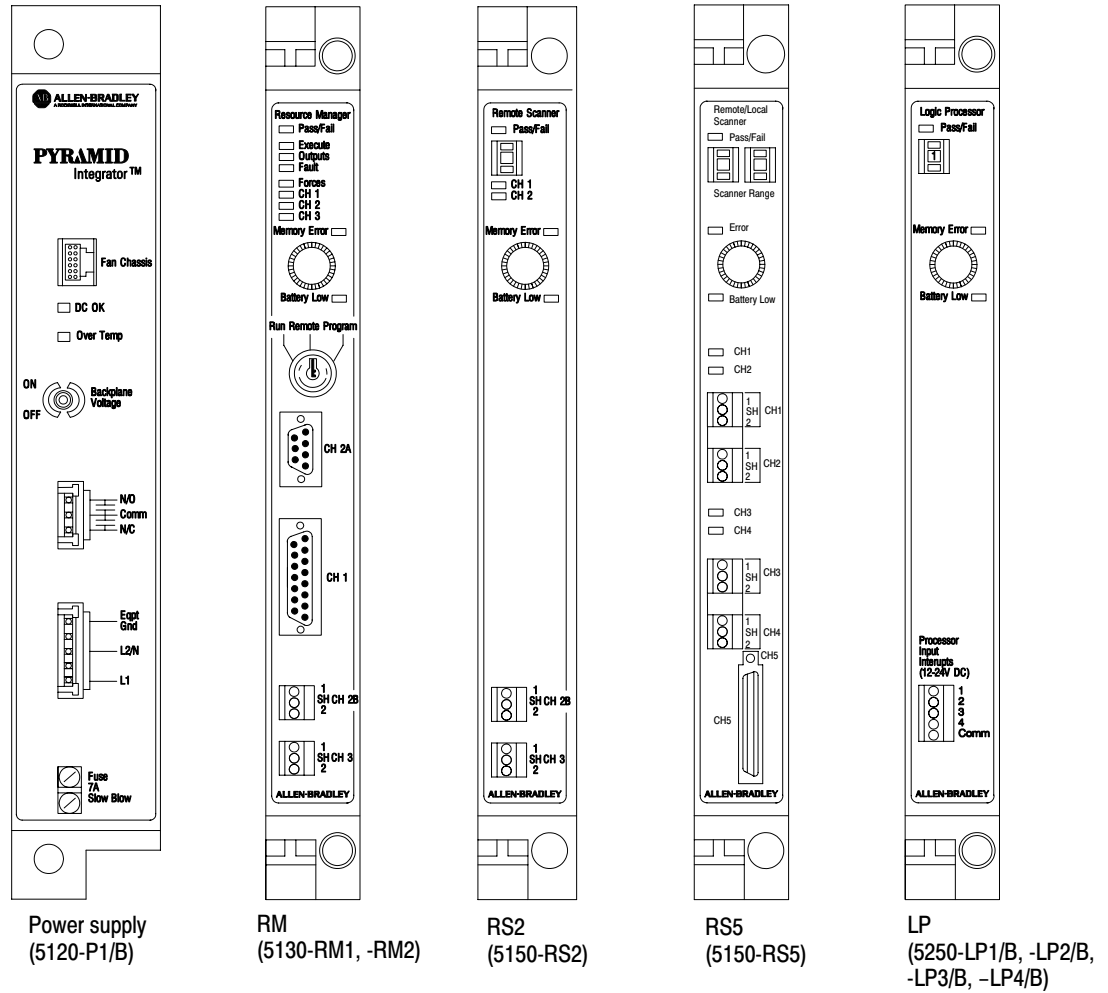
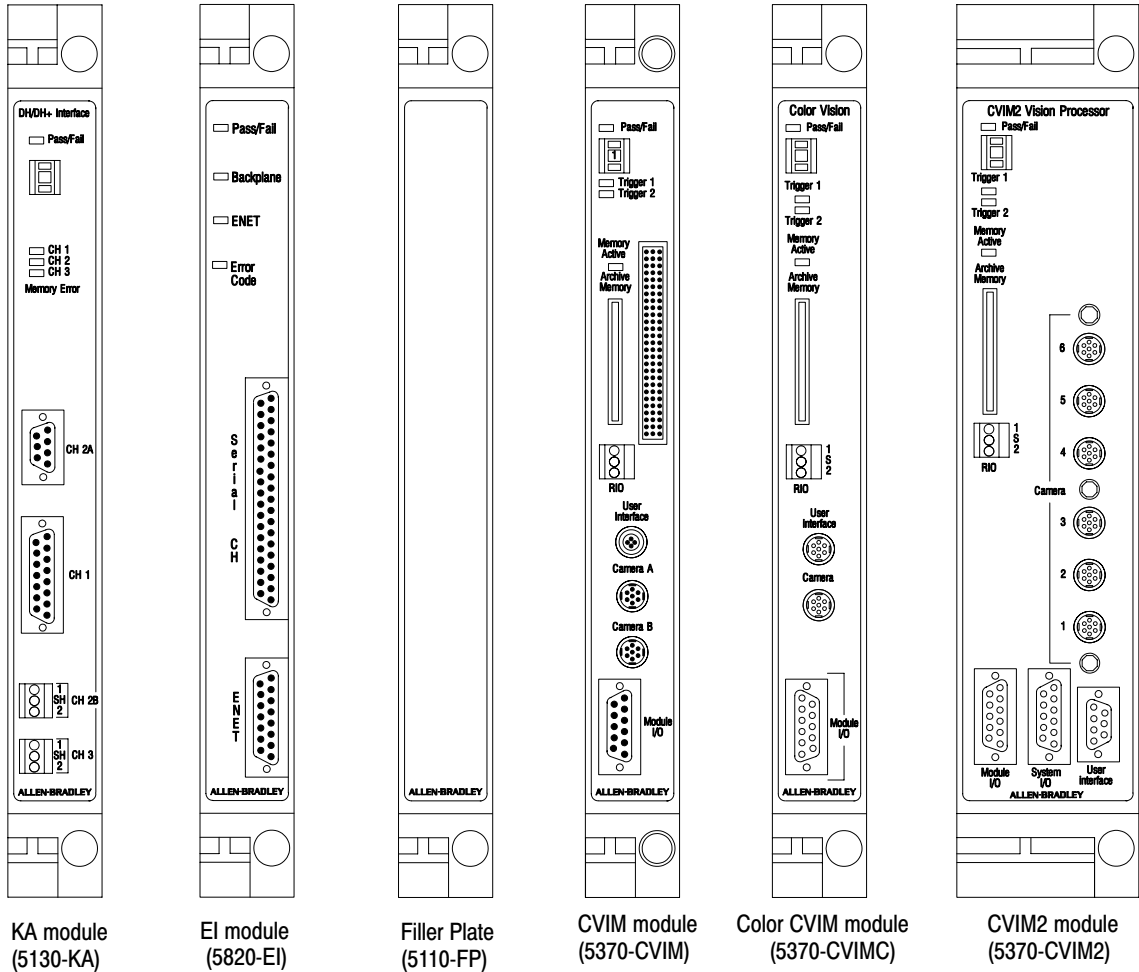
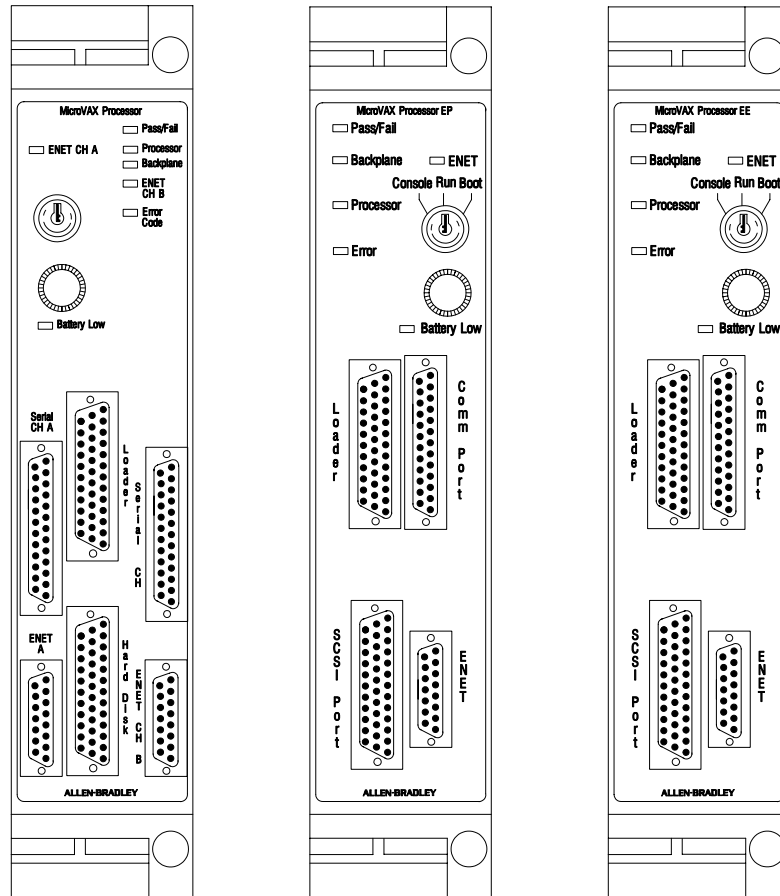


Figure 1.4
Modules (continued)



17185b

Figure 1.5
Modules (continued)



MicroVAX Information
Processor (5730-CPU1)

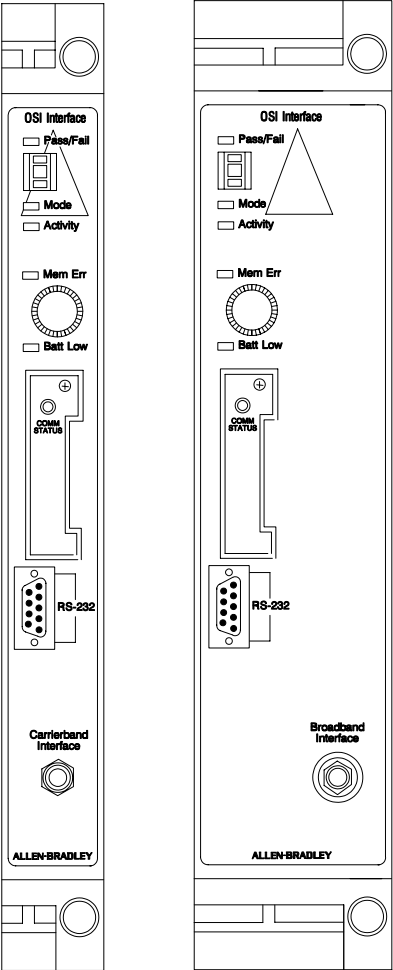
MicroVAX Information
Processor EP (5731-CPU1)

MicroVAX Information
Processor EE (5731-CPU2)

17185a

Figure 1.6
Modules (continued)

The cat. no. 5820-CC
is used on an 802.4
carrierband network

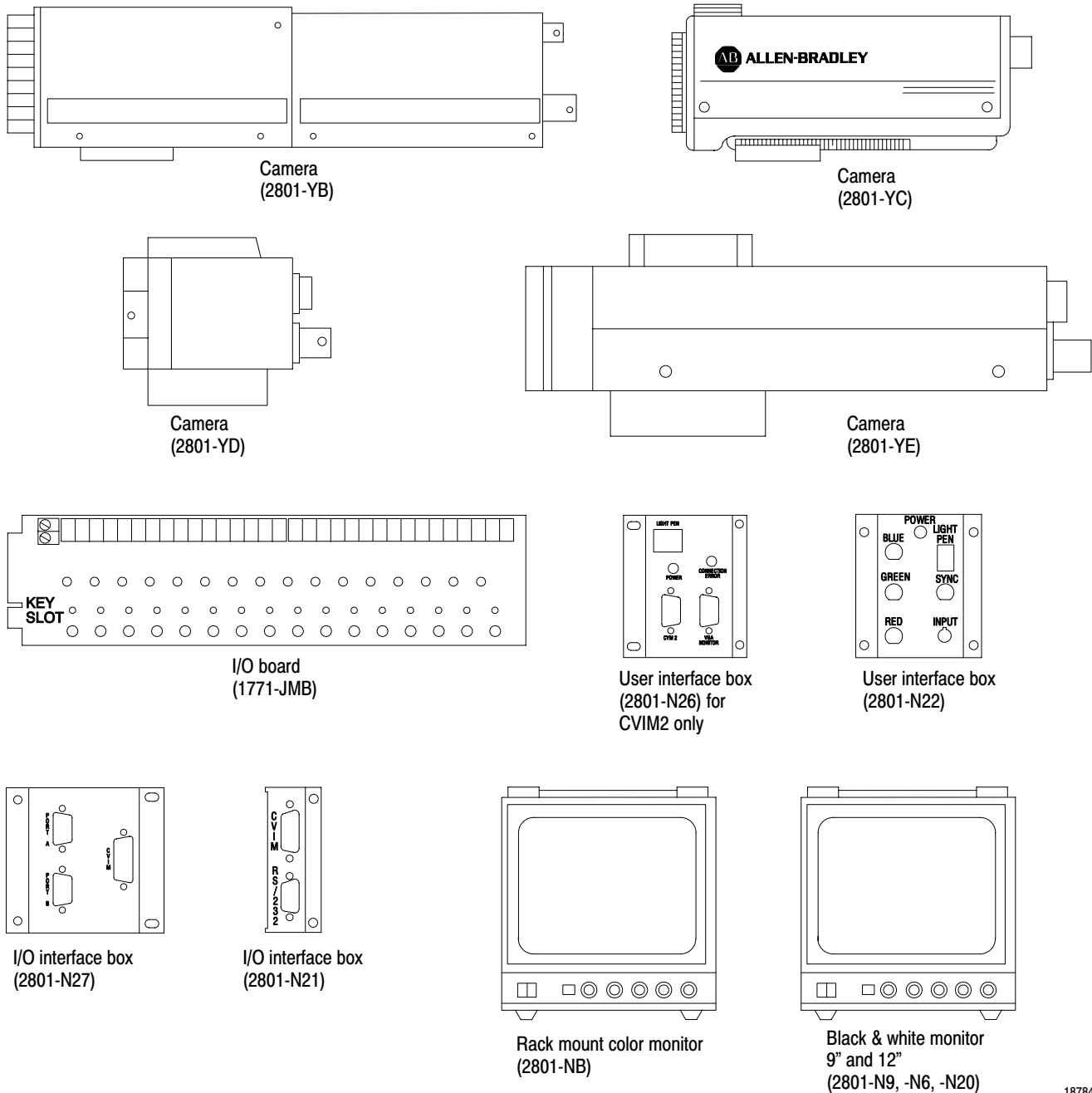


OSI Interface
Carrierband module
(5820-CC)

OSI Interface
Broadband module
(5820-CBx)

18395

Figure 1.7
Vision Components



18784

Figure 1.8
Industrial Disk

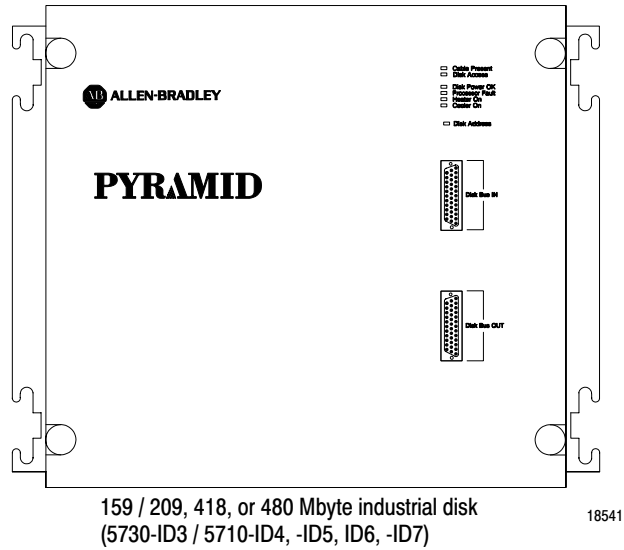


Figure 1.9
4-Port Distribution Panel

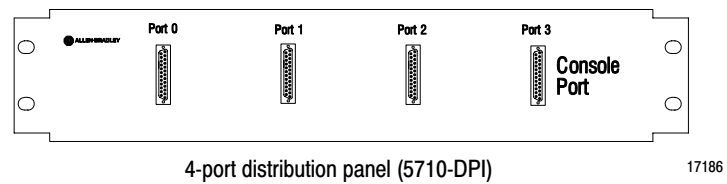
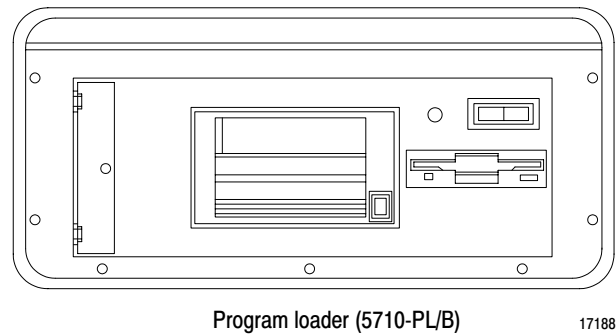


Figure 1.10
Program Loader



Module Weights

Here are the weights of the PI modules, the fan assembly, industrial disks, and the 4- and 8-slot chassis:

Module:	Pounds:	Kilograms:
RM	4 lbs, 4.0 oz	1.92 kg
LP	3 lbs, 13.5 oz	1.74 kg
RS2	3 lbs, 11.0 oz	1.67 kg
RS5	2 lbs, 15.6 oz	1.35 kg
MicroVAX Information Processor EP	8 lbs, 6.5 oz	3.81 kg
MicroVAX Information Processor EE	8 lbs, 6.5 oz	3.81 kg
MicroVAX Information Processor	9 lbs, 6.0 oz	4.24 kg
Ethernet Interface module	5 lbs, 3.0 oz	2.35 kg
CVIM module	3.70 lbs	1.68 kg
Color CVIM module	3.70 lbs	1.68 kg
CVIM2 module	7.97 lbs	3.62 kg
KA module	3 lbs, 11.0 oz	1.67 kg
OSI carrierband interface module	7 lbs	3.17 kg
OSI broadband interface module	8 lbs	3.62 kg
power supply	9 lbs, 10.0 oz	4.38 kg
fan assembly	11 lbs, 5.0 oz	5.12 kg
4-slot chassis	5 lbs, 8.0 oz	2.5 kg
8-slot chassis	12 lbs, 1.0 oz	5.48 kg
industrial disk (5710-ID4, -ID5, -ID6, -ID7)	58 lbs	26.24 kg
industrial disk (5730-ID3)	63 lbs, 12 oz	28.95 kg

What to do Next

Go to chapter 2 to mount the components.

Mounting the Components

Chapter Objectives

Read this chapter to learn how to mount various system components.

To Mount the System Components

To mount the system components, complete the tasks below:

- gather the mounting documentation
- gather the PI components
- gather the tools and supplies
- rack mount the components and/or
- panel mount the components

If your system includes the hardware below, also complete these tasks:

- mount the fan assembly
- mount the camera
- mount the black and white monitor

Gather the Mounting Documentation

Gather the mounting documentation. Check this documentation and determine the:

- components you are mounting
- method of mounting to use (panel or rack)
- position of the components

Gather the PI Components

Gather the PI components you will mount. If you are mounting any of the following components, see either the rack or panel mounting procedure:

- 4-slot chassis
- 8-slot chassis
- industrial disk
- 4-port distribution panel
- I/O board for vision
- I/O chassis and power supply
- rack mount color monitor

If you are mounting the following hardware, go to page [2-8](#).

- fan assembly
- camera
- black and white monitor
- I/O interface box
- user interface box

Gather the Tools and Supplies

Gather these tools and supplies you will need:

- #10-32 screws, lock washers, flat washers and screw driver set, if you are rack mounting
- #10-32 screws, lock washers, flat washers, and drill and tapping equipment if you are panel mounting
- wrench set, if applicable
- wire brush
- tape measure
- marker or grease pencil
- copper ground bus
- two spacers, for use between the ground bus and panel

To:	Then:
Panel mount the components	go to page 2-5 .
Rack mount the components	continue reading.

Rack Mount the Components

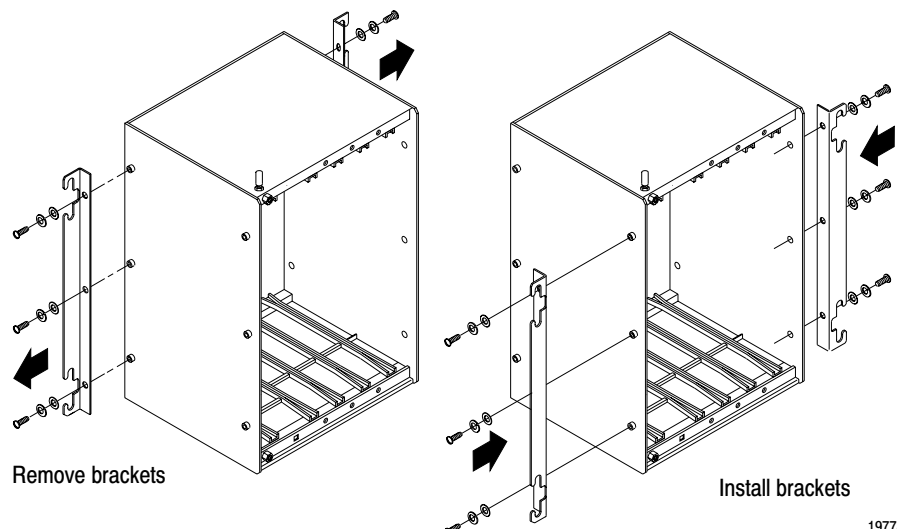
After you have gathered the equipment, mounting documentation, and tools, you are ready to mount the components.

Follow these steps to rack mount the components.

1. Prepare each component.

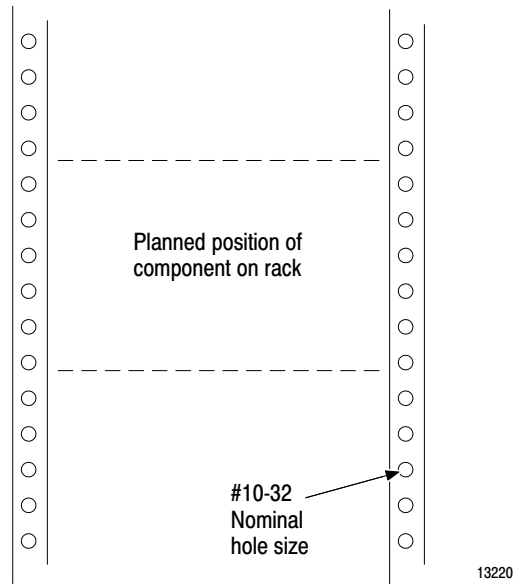
For the 4- and 8-slot chassis, remove the brackets from the back of the chassis, and install them on the front of the chassis for rack mounting.

If you are using fan assembly, attach the fan assembly to the bottom of the chassis and then mount the chassis to the rack or panel.



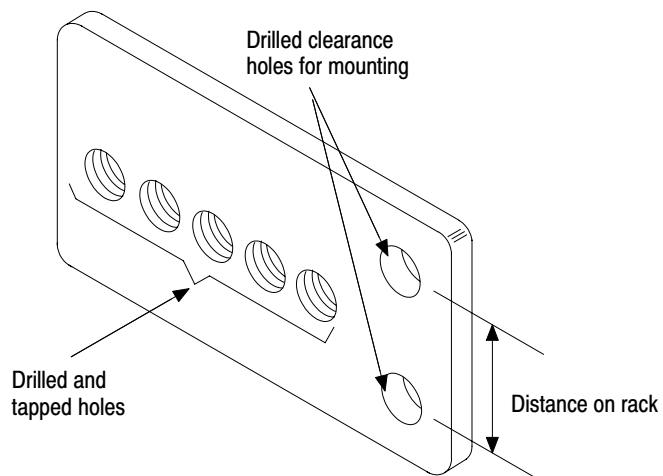
2. Prepare the rack.

Mark the position of each component you will mount. Make sure the holes line up with the holes of the mounting brackets.



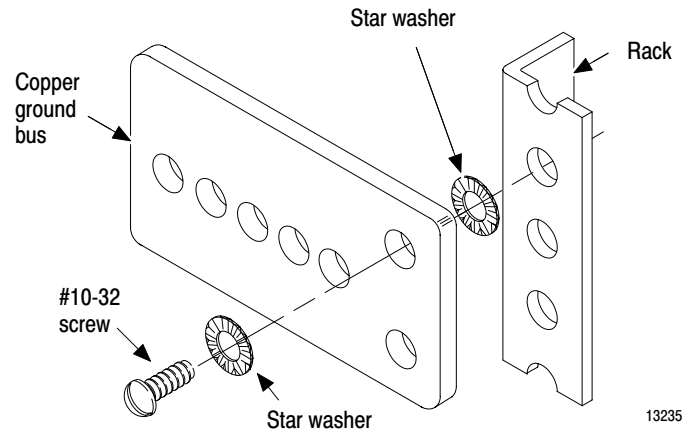
3. Mount a copper ground bus on the rack:

- a. Drill two clearance holes for #10-32 mounting screws in the bus. Drill and tap a #10-32 hole for each component you will attach to the rack.

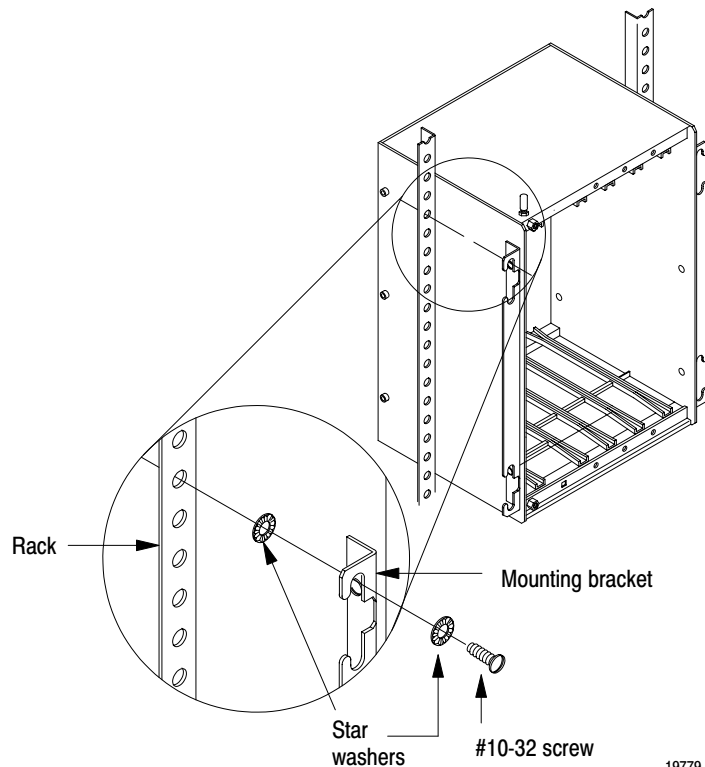


- b. Prepare a mounting location for the bus as indicated by the mounting diagram and as you did in step 2.

- c. Attach the ground bus to the rack using the two drilled mounting holes. One connection is shown below.



4. Repeat this procedure for each component you mount:
- a. Position the component on the spot you have prepared for it on the rack.
 - b. Attach the component using #10-32 screws and lock washers. Do not tighten the screws yet (you will tighten the screws after you ground the components).

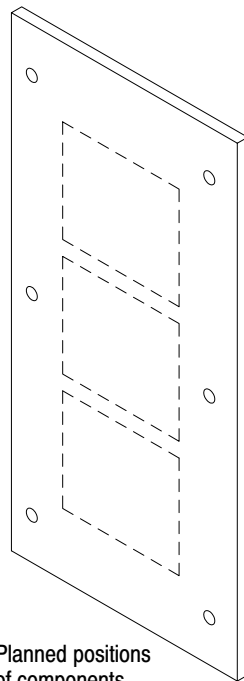


Panel Mount the Components

With the equipment, mounting documentation, and tools you are ready to mount the components.

Follow these steps to panel mount the components.

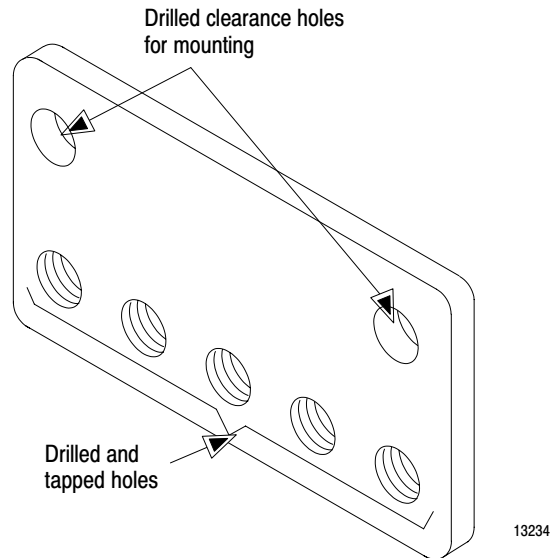
1. Prepare the panel:
 - a. Remove the panel from its enclosure and lay the panel flat, with its front facing up.
 - b. Using the mounting worksheet from your system designer, mark the location of the component on the panel for each component you will mount.



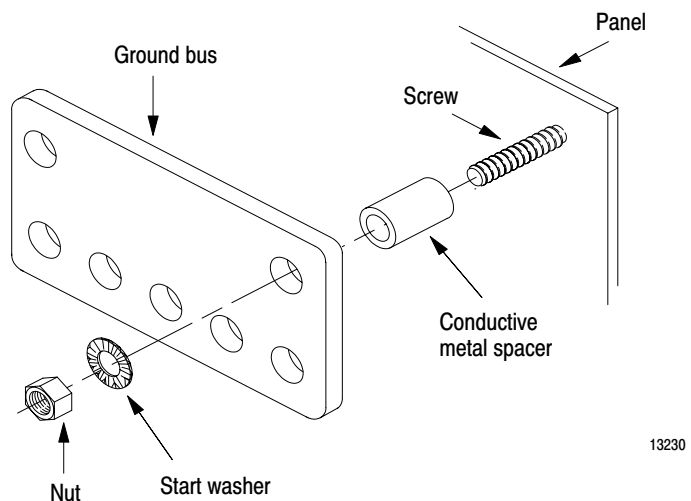
Planned positions
of components

16731

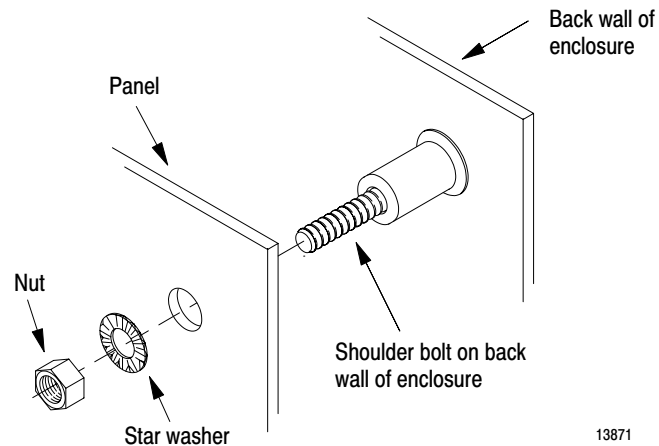
2. Prepare to attach the component to the panel: drill and tap a #10-32 hole through the panel at each point where component will attach.
3. Mount a copper ground bus on the panel:
 - a. Drill two clearance holes for #10-32 inch mounting screws in the bus. Drill and tap a #10-32 hole for each component you will mount on the panel.



- b. Connect the ground bus to the panel using the mounting holes, as shown below.

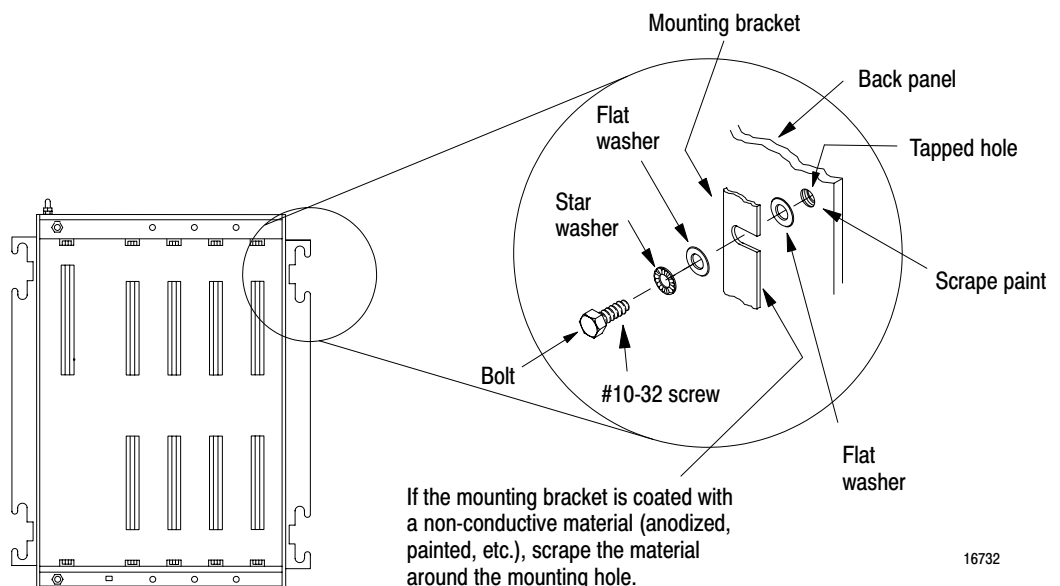


4. Return the panel to its enclosure:
 - a. Scrape paint and other nonconductive finishes from the shoulder studs on the back wall of the enclosure. Scrape clear an area at least as large as the washer to be used.
 - b. Attach the panel to the back wall of the enclosure as shown here:



13871

5. Repeat this procedure for each component you mount:
 - a. Position the component on the screws you have prepared for it on the panel.
 - b. Attach the component to the panel as shown below. Do not tighten the nuts yet (you will tighten the nuts after you have completed grounding the component).

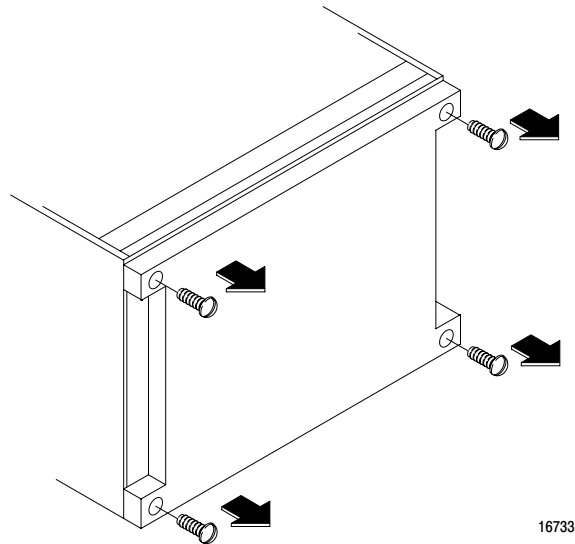


16732

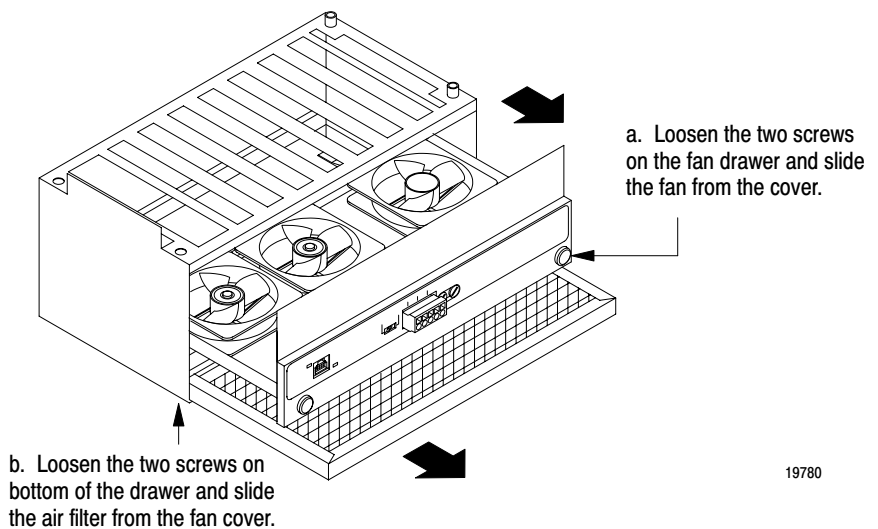
Mount the Fan Assembly

To mount the fan assembly, follow the steps below:

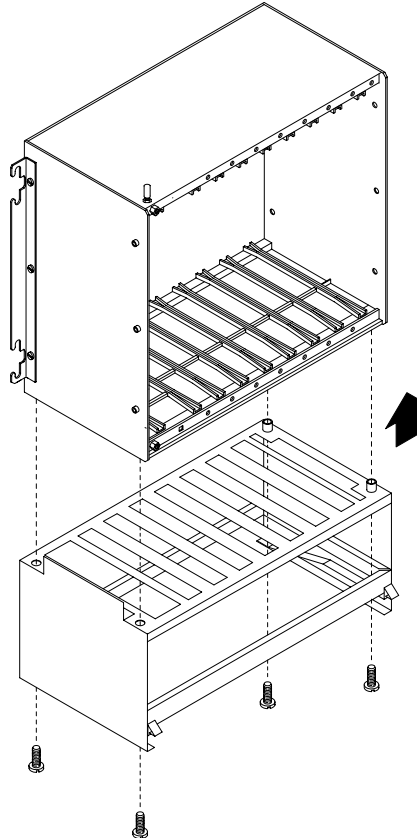
1. Remove the four screws in the bottom of the 8-slot chassis with a phillips screwdriver.



2. Remove the fan drawer and air filter from the fan cover.

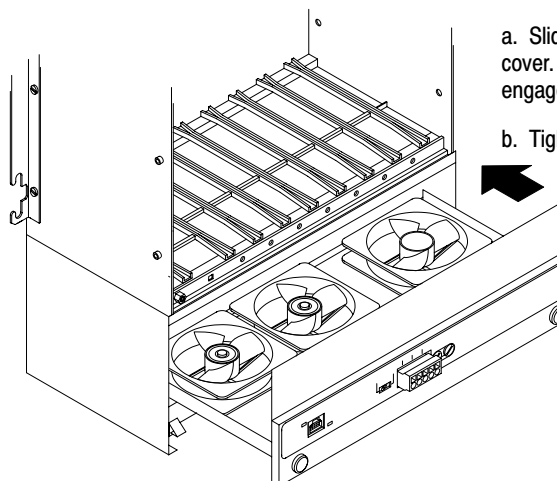


3. Attach the fan cover to the bottom of chassis:
 - a. Place the fan cover under the chassis. Make sure the screw holes line up.
 - b. Place the four screws into the holes and tighten them.



19781

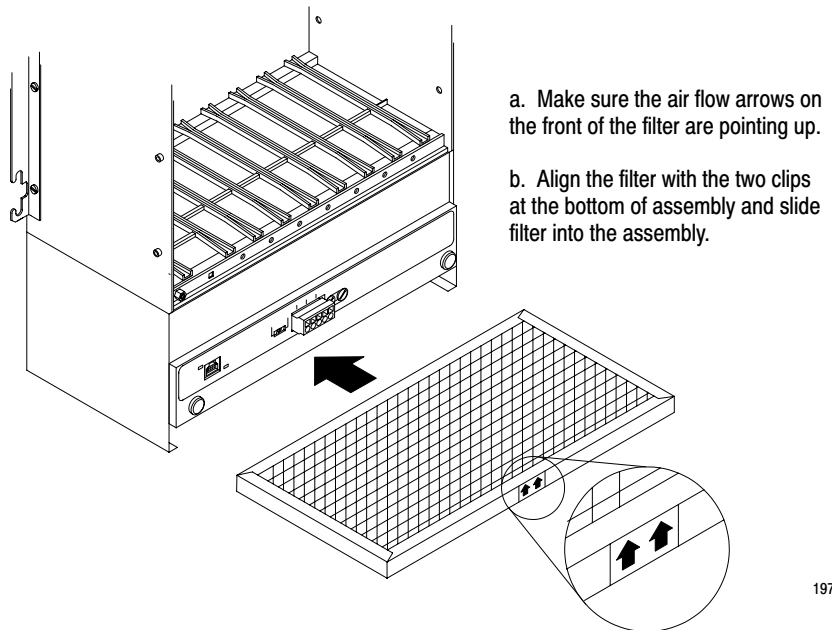
4. Install the fan drawer:



- a. Slide the fan drawer into the fan cover. Make sure the fan drawer engages the rear edge of the fan cover.
- b. Tighten the two captive screws.

19782

5. Install the filter:



19783

Mount the Camera

To mount a camera, follow the steps below.

- 1. Mount the camera on your own mounting bracket.**
 - a. Design your bracket so that it:
 - does not cover any connectors
 - allows you to adjust the lens
 - holds the camera steady
 - attaches to the mounting holes on the camera
 - b. Mount the bracket in the indicated position in the mounting documentation.
 - c. Attach the bracket to the camera.
- 2. Attach the optional camera enclosure, if your configuration has it.**

Mounting a Black and White Monitor (2801-N6,-N9,-N20)

Check the mounting documentation to see how you should mount the black and white monitor.

If mounting:	Make sure:
on a table or shelf	- the connectors are accessible so you can connect the cables to the monitor - the table or shelf can hold the weight of the monitor place the monitor in the position indicated by the mounting documentation.
on a shelf that slides out of a rack	- to attach the slides and shelf to the rack by following the documentation for the slides - to place the monitor on the slides
a color monitor	you follow the rack mounting procedure at the beginning of this chapter.

Mounting the I/O Board 1771-JMB

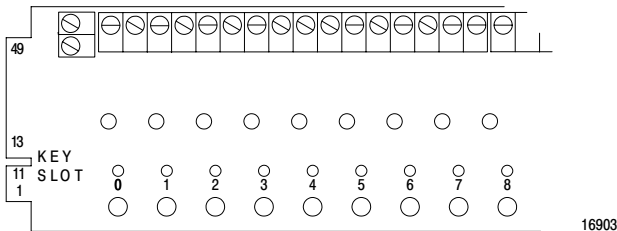
To mount the I/O board, attach the:

- I/O interface box to I/O board and attach to mounting surface
- user interface box to I/O board and attach to mounting surface

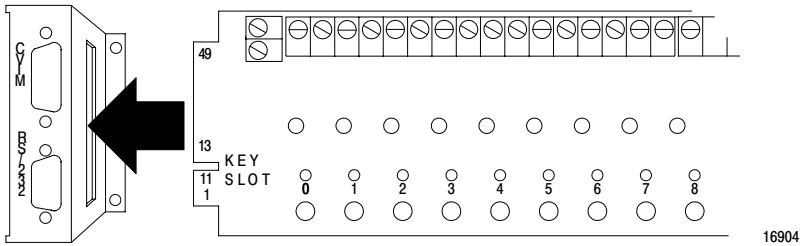
Attach I/O Interface Box

Attach the I/O interface box to the I/O board by following the steps below.

1. Locate the 50-pin connector on the side of the I/O board.



2. Plug the I/O interface box's 50-pin connector to the I/O board's 50-pin connector.

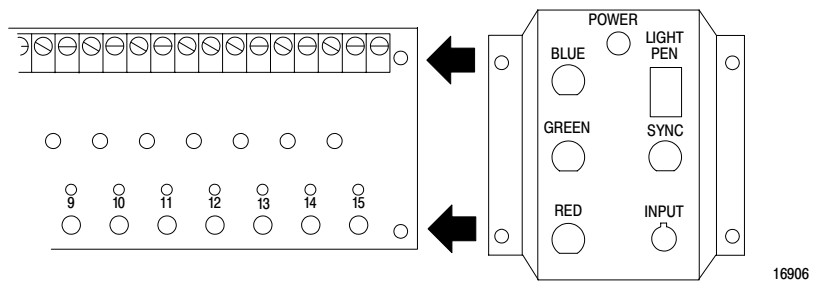


3. Secure the I/O interface box and the I/O board to the mounting surface using two screws.

Attach the User Interface Box

To attach the user interface box, follow the steps below:

1. Align the flange of the user interface with the two standoffs on the bottom of the I/O board.



2. Secure the user interface and I/O board to the mounting surface using two screws.

What to do Next

After you have mounted the components, go to chapter 3 to ground the system.

Grounding the Components

Chapter Objectives

Read this chapter to learn how to ground the components.

To Ground the Components

To ground the components, complete the following:

- gather the grounding documentation from your system designer
- gather the necessary tools and supplies
- ground the components

Gather the Grounding Documentation

Gather and check the grounding documentation to locate the point of each component that you are to ground.

Important: The 4- and 8-slot chassis have a grounding stud located on the top left front of each chassis. Use the grounding stud to ground the chassis.

Gather the Necessary Tools and Supplies

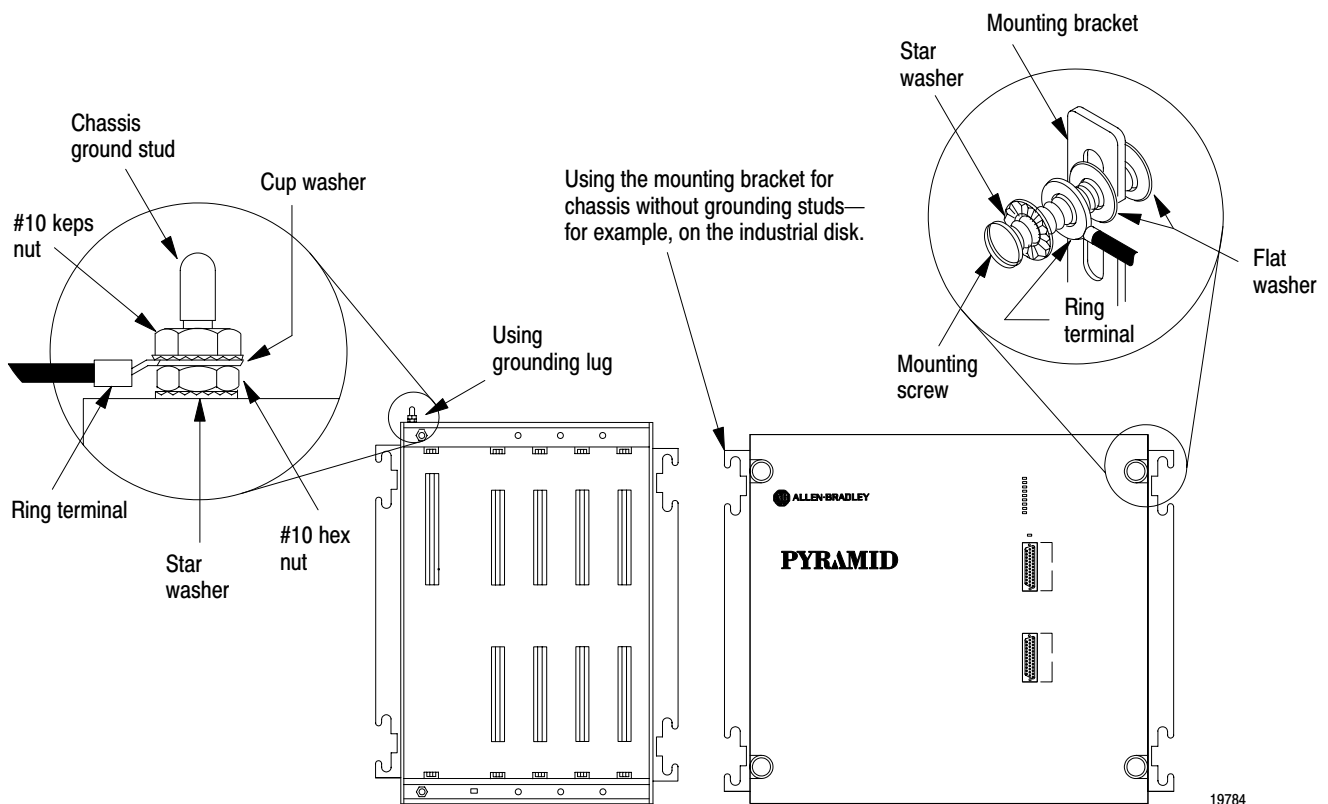
Gather the following tools you will use to ground the chassis and camera:

- 8 AWG stranded wire or equivalent tinned braided cable (the exact wire should be indicated on the grounding documentation from your system designer)
- screw driver set
- a wire cutter/stripper
- a quantity of #10-32 screws and ring terminals

Ground the Components

Follow the grounding documentation and the steps below to ground the components.

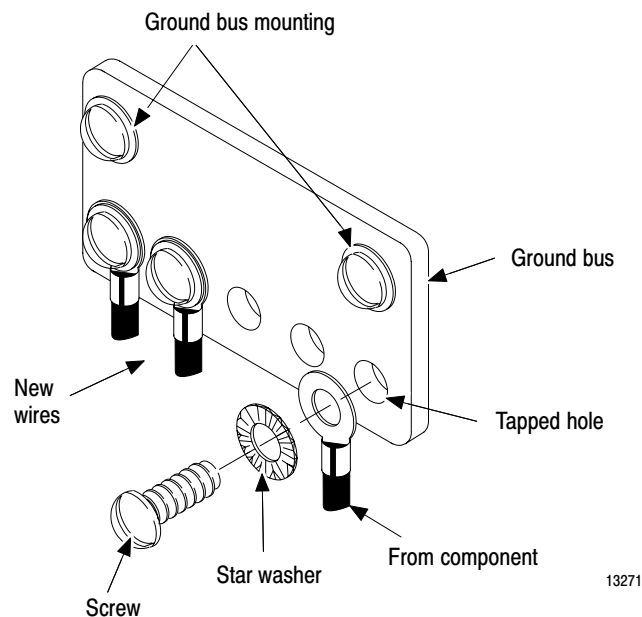
1. Prepare and connect grounding conductors to the components.
 - a. Determine which mounting point on the chassis you are going to use to ground the components (some chassis have grounding lugs; for other chassis, you have to use a mounting screw).
 - b. Construct an equipment-grounding conductor for each component. Make each one long enough to connect directly to the ground bus. Keep the length to a minimum. Use the specified wire and ring lugs.
 - c. Connect one end of each conductor to each component and leave the other end loose, as shown below.



- d. Tighten all mounting nuts or screws on the components.

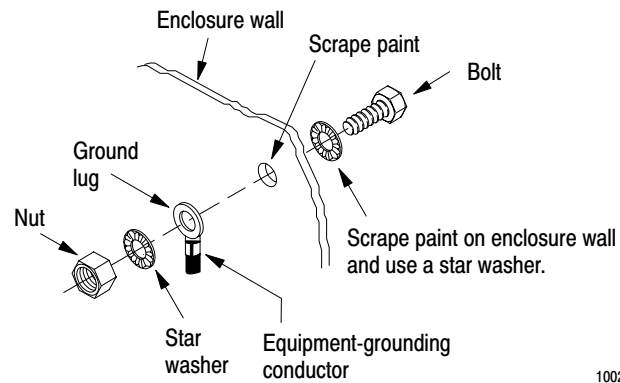
2. Prepare and connect grounding conductors to the ground bus:
 - a. Construct an equipment-grounding conductor long enough to extend from the ground bus to an enclosure wall. Use 8 AWG stranded wire or equivalent tinned braided cable copper wire (the exact AWG should be in the grounding documentation from the system designer) and ring terminals.
 - b. Construct a grounding-electrode conductor long enough to extend from the bus to your grounding electrode system (earth ground potential). Use 8 AWG copper wire (the exact AWG should be in the grounding documentation from the system designer) and ring terminals.
 - c. Connect the loose equipment-grounding conductors from step 1 and the two new conductors to the ground bus as shown below.

You can connect the conductors to the bus in any order.



3. Connect the equipment-grounding conductor and grounding-electrode conductor.
 - a. Connect the equipment-grounding conductor to an enclosure wall, as shown below.
 - b. Scrape paint and other non-conductive finishes from both sides of the enclosure wall, at the point where the grounding conductor will attach. Be sure to scrape clear an area at least the size of the ring terminal to be used.

Important: Make sure the scraped surface of the enclosure wall is in contact with the total surface area of the ring terminal.



10020

- c. Connect the grounding electrode conductor to your grounding electrode system (earth ground potential). We recommend a direct earth ground for maximum protection.



ATTENTION: Do not use an indirect earth ground, such as a water pipe, building structure, or power distribution system, otherwise your components may experience grounding problems.

What to do Next

After you have grounded the components, go to chapter 4 to continue installing your system.

Installing the Modules

Chapter Objectives

This chapter shows you how to install each module and is divided into sections that cover the installation tasks for each module.

How to Use this Chapter

Use this chapter with the completed module worksheets from the *PI Design Manual* (5000-6.2.1) to perform various installation tasks for each module. The worksheets contain specific settings and connections for each module. This chapter describes how to make those settings and connections. Also, it guides you to additional connection information for the module.

After you have used the worksheets to install the modules, we suggest you keep them with the system for future reference.

To install a PI module in a chassis, see appendix A.

Help to Prevent Electrostatic Damage

When you:

- remove the modules from the protective bags
- set the jumpers or switches inside a module
- change memory boards

Do so in a static-safe environment. As a minimum, we recommend the 3M Type 8005 Portable Field Service Grounding Kit or its equivalent for providing a static-safe environment.



ATTENTION: If you perform operations on a module improperly, you may cause an electrostatic discharge, which can damage the module. Perform internal operations, such as setting the jumpers, only in a static-safe environment.

Lithium Battery Information

PI modules that come with a lithium battery are:

- MicroVAX Information Processor
- LP
- RM
- RS
- OSI interface module

Disposing of a Lithium Battery



ATTENTION: Do not incinerate or dispose of lithium batteries in general trash collection. Explosion or violent rupture is possible.

Follow these guidelines when you dispose of the module's battery.

Important: Check your state and local regulations that deal with the disposal of lithium batteries.

Do not:	Because the battery:
dispose of lithium batteries whose combined weight is greater than or equal to 1/2 gram in general trash collection	could become dangerous
incinerate or expose the battery to high temperatures	could explode
solder the battery or leads	could explode
open, puncture, or crush the battery	could explode and toxic, corrosive, and flammable chemicals could be exposed
charge the battery	could explode or the cell might overheat and cause burns
short positive or negative terminals together	will heat up
ship on passenger aircraft	could become dangerous
ship while connected to equipment	could become dangerous

Batteries should be collected for disposal in a manner to prevent short circuiting, compacting, or destruction of case integrity and hermetic seal.

For disposal, batteries must be packaged and shipped, in accordance with transportation regulations, to a proper disposal site. The U.S. Department of Transportation authorizes shipment of "lithium batteries for disposal" by motor vehicle only in regulation 173.1015 of CFR49 (effective Jan. 5, 1983). For additional detailed information, contact:

U.S. Department of Transportation
Research and Special Programs Administration
400 Seventh Street., S.W.
Washington, D.C. 20590

Although the United States Environmental Protection Agency at this time has no regulations specific to lithium batteries, the material contained in the battery may be considered toxic, reactive, or corrosive. The person disposing of the material is responsible for any hazard created in doing so. State and local regulations may exist regarding the disposal of these materials.

Emergencies

Emergencies can occur due to the battery's makeup.

Major components of the cell are:	And these components are:
lithium metal	highly reactive in water, flammable, and can create toxic fumes when burned.
inorganic electrolyte thionyl chloride (SOCl ₂)	fast evaporating, corrosive, has a pungent odor, reacts violently to water, causes burns on contact, and produces toxic and corrosive fumes and chemicals upon decomposition.

Storing Lithium Batteries

To avoid hazardous situations, follow the guidelines below:

- store in a cool, dry environment; typically 20 to 25° C (68 to 77° F) and 40 to 60% relative humidity
- replace the batteries at least every two years
- do not store used batteries longer than three months before disposal
- use a first-in/first-out system for handling the batteries
- clearly mark the contents of the storage area
- do not smoke in the storage area
- regularly monitor the temperature and humidity of the storage area
- storage area should be well-ventilated and fire-protected; it should have a system that automatically detects fires, extinguishes fires, and activates an alarm signal

Personnel Protection

Safety equipment should be available and personnel should be equipped with self-contained breathing apparatus, safety shields, safety goggles, and protective clothing when they have to handle overheated or leaking batteries.

Overheated Battery

When a lithium battery is overheated, explosion or violent rupture is possible. Attempt to eliminate any external source of heat. If connected to equipment, un-power the equipment. After cooling, remove the battery to a well-ventilated fire-protected area.

Leaking Battery

If the hermetic seal of the case is broken, ventilate the area. Using tongs, scoop, or shovel, remove the leaking battery to a well-ventilated fire-protected area.

Fire



ATTENTION: Do not use water or carbon dioxide (CO₂) fire extinguishers on the fire. Lithium is reactive with these substances.

As described for overheated batteries, explosion or violent rupture is possible. If a cell is ruptured, the exposed lithium is combustible and is reactive in water. If lithium is burning, use a Class D Powder fire extinguisher or smother with a graphite powder, such as Lith-X, or an appropriate metal fire extinguishing powder, applied with a long-handled tool. Avoid exposure to toxic fumes from burning lithium.

Gather the Module Documentation

Gather the module documentation and check to see which modules you are installing. See Table 4.A for which page you should go to for the procedures.

Table 4.A
Installing PI Modules

If you are installing this module:	See page:
power supply (5120-P1/B)	4-5
RM (5130-RM1,-RM2) KA module (5130-KA)	4-8
RS (5150-RS2, -RS5)	4-15
LP (5250-LP1,-LP2,-LP3,-LP4)	4-18
vision processor (5370-CVIM, -CVIM2, -CVIMC)	4-20
MicroVAX Information Processor module (5730-CPU1, 5731-CPU1, -CPU2)	4-21
EI module (5820-EI)	4-24
OSI carrierband interface module (5820-CC)	4-26
OSI broadband interface module (5820-CBx)	4-26



ATTENTION: If you have any empty slots in the chassis, install filler plates (5110-FP) in them. Otherwise, the modules could be damaged. To install filler plates, see appendix A.

Many of the connections you make to the modules are made to connectors that you wire. If you do not know how to wire these connectors, see appendix A.

Important: Save the packing material in case you have to ship a module.

Power Supply

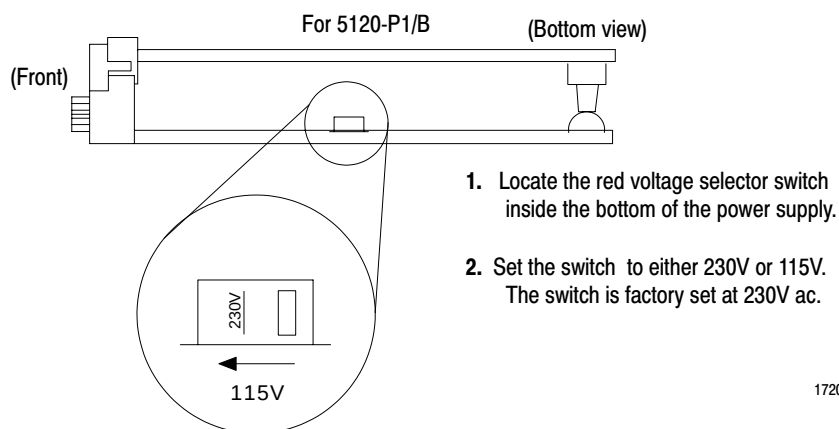
To install the power supply, complete the following tasks:

- set the power supply operating voltage
- install the power supply in the chassis
- make connections to the power supply

Set the Operating Voltage Switch (115 or 230V ac)

Follow the steps below to set the operating voltage.

Important: You do not have to remove any covers to set the operating voltage.



17204

Install the Power Supply in the Chassis

The installation procedure for the power supply is similar to other PI modules, see “Installing a PI Module in the Chassis” in appendix A to install the power supply in the chassis.

Connect the Fan Assembly/External Power Source

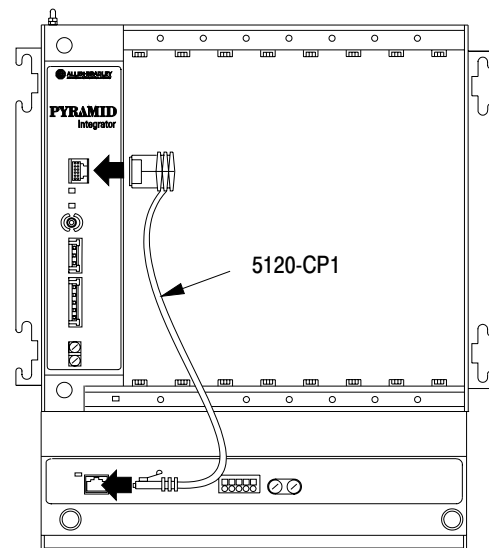
If you have a fan assembly or are connecting the power supply to an external power source, make this connection. If you don't have to make this connection, go to the next section. To make this connection, follow the steps below.

1. Determine which fan assembly and/or power source connections you are making.

If you have this configuration:	Make this connection:	With this cable:	Go to this step:
PI chassis with MicroVAX Information Processor and no vision processor	power supply to fan assembly	cat no. 5120-CP1	2.
PI chassis with a MicroVAX Information Processor and at least one vision processor	power supply to fan assembly and external power source	cat no. 5120-CP2	3.
• PI chassis with more than two vision processors • At least one vision processor, PLC-5/250 controller and no MicroVAX Information Processor	power supply to external power source	cat no. 5120-CP3	4.

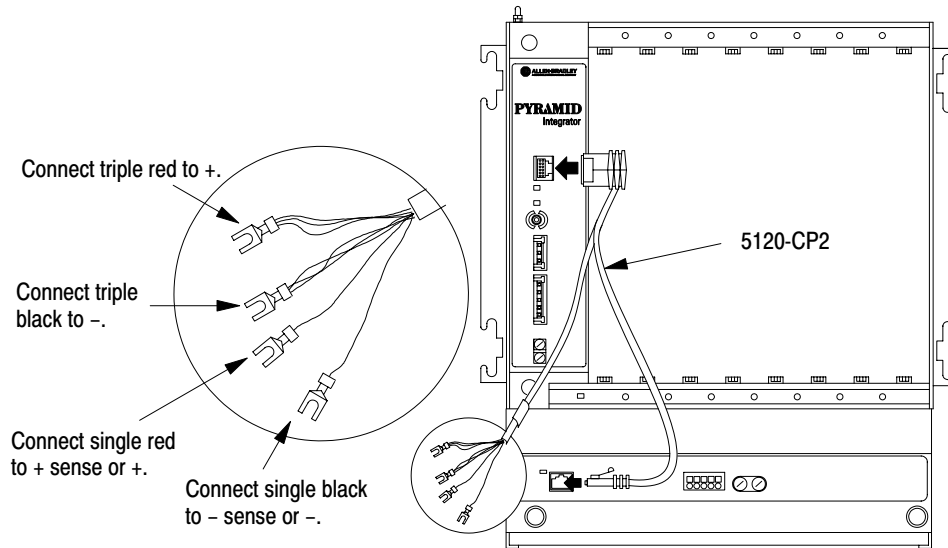
2. Connect the 5120-CP1 cable to the fan chassis and the power supply.

- a. Gather the fan status cable that came with the fan assembly.
- b. Connect the right-angle connector of the fan status cable to the port labeled FAN CHASSIS on the power supply.
- c. Route the fan status cable away from the Interlock Relay and Line Voltage connectors.
- d. Connect the straight end of the cable to the port labeled FAN STATUS CABLE on the fan chassis.



19785

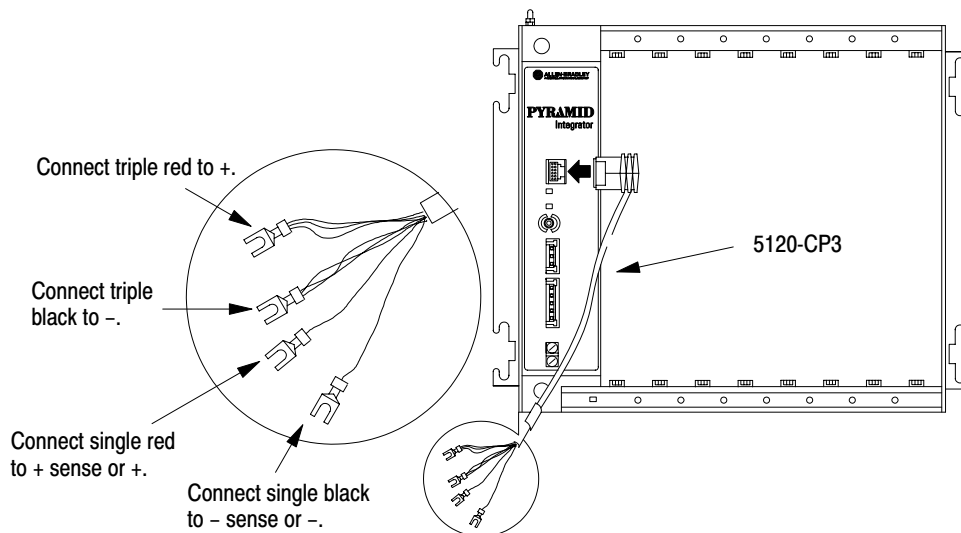
3. Connect the 5120-CP2 cable to the fan chassis, the power supply and a 24V external power supply.



- a. Connect the spade lugs to an external 24V power supply.
- b. Connect the right-angle connector of the 5120-CP2 cable to the port labeled FAN CHASSIS on the power supply.
- c. Route the cable away from the Interlock Relay and Line Voltage connectors.
- d. Connect the straight end of the cable to the port labeled FAN STATUS CABLE on the fan chassis.

19786

4. Connect the 5120-CP3 cable to a 24V external power supply.



- a. Connect the spade lugs to an external 24V power supply.
- b. Connect the right-angle connector of the 5120-CP3 cable to the port labeled FAN CHASSIS on the power supply.
- c. Route the cable away from the Interlock Relay and Line Voltage connectors.

19787

Connect to Interlock Relay

See chapter 9 to connect the interlock relay.

Connect to Line Voltage

See chapter 10 to connect ac power.

RM/KA Module

To install the RM/KA module, use the worksheets as guides and complete the following:

- set the RM/KA module switches and jumpers
- install the module in the chassis
- install the battery (RM only)
- set the KA module address
- make connections to the module
- set the keyswitch (RM only)

Set the RM/KA Module Switches and Jumpers

Set the RM/KA module switches and jumpers to configure:

- switch bank 1 (communication parameters)
- switch bank 2 (station address)
- jumpers 9 and 10 (termination resistor)
- jumpers 5-8 (channel 1 interface)



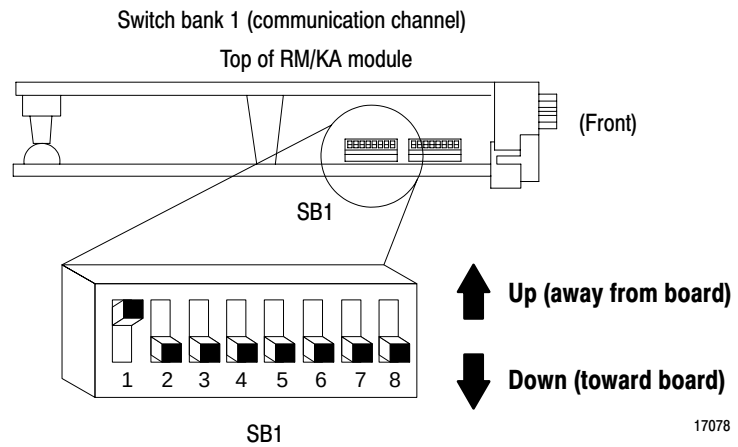
ATTENTION: If you perform operations on a module improperly, you may cause an electrostatic discharge, which can damage the module. Perform internal operations, such as setting the jumpers, only in static-safe environment.

Channel 1 is factory set to RS-232. You do not have to remove the memory board unless you are changing the channel 1 interface.

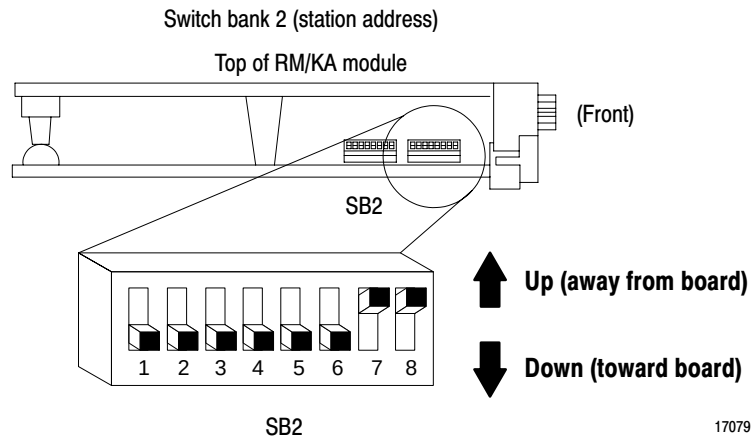
Follow the steps below to set the jumpers and switches.

Set Switch Bank

1. Set switch bank 1 as shown on the worksheet for the RM/KA module.

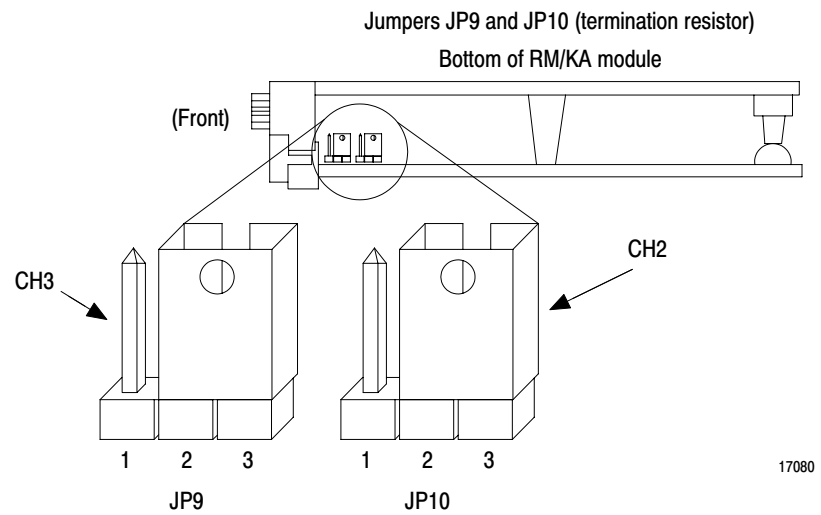


2. Set switch bank 2 as shown on the worksheet for the RM/KA module.



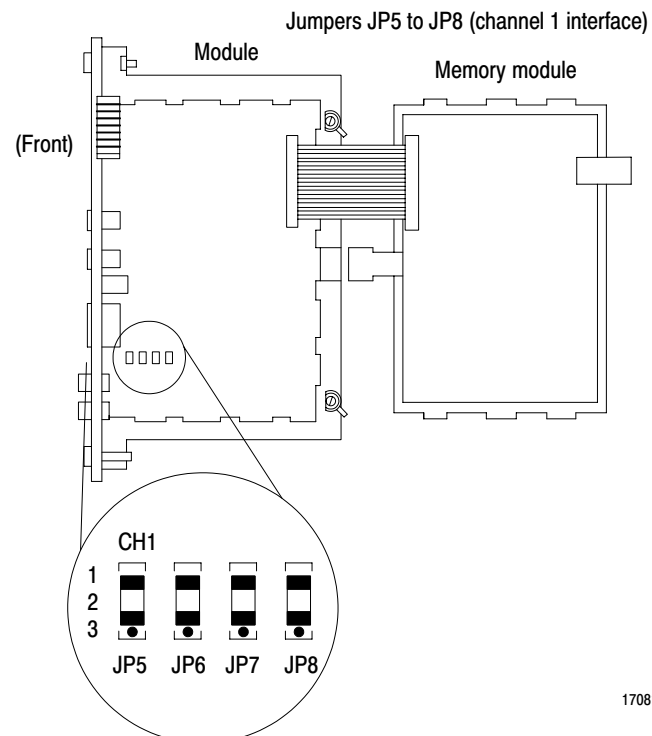
Set Jumpers 9 and 10

Set jumpers 9 and 10 as shown on the worksheet for the RM/KA module.



Set Jumpers 5 through 8

Set jumpers 5 through 8 as shown on the worksheet for the RM/KA module.

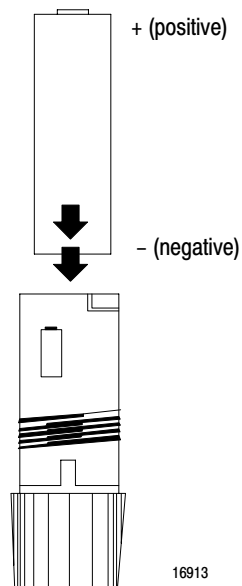


Install the RM/KA Module

Install the RM/KA module as shown in appendix A.

Install the Battery (RM only)

1. Unscrew the battery holder from the module.
2. Insert the battery (that came with the module) into the holder as shown below.



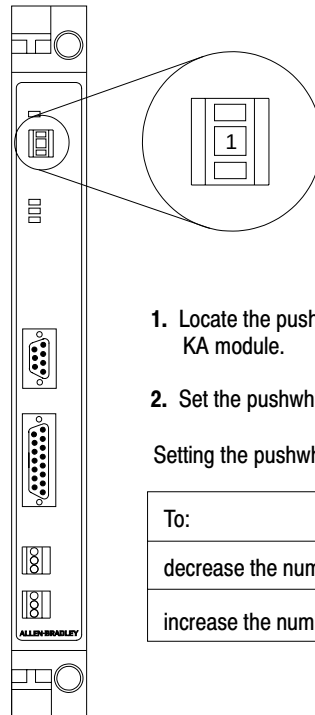
3. Screw the battery holder (with battery inserted in holder) into the module. Make sure you do not overtighten the battery holder.

When you first install the RM, it powers up with a red fault LED illuminated. You have to clear memory with 6200 software or INTERCHANGE software or re-download a previously saved PLC-5/250 configuration to clear this LED. You must clear this LED before you can use the PLC-5/250 processor.

Set the KA Module Address

Follow the steps on the next page to set the KA module address. The address must start at 1 for the first interface module and be consecutive for the other interface modules up to 4.

KA module



1. Locate the pushwheel on the front panel of the KA module.
2. Set the pushwheel as indicated on the worksheet.

Setting the pushwheel:

To:	Push the:
decrease the number	top button
increase the number	bottom button

17973

Connect the RM/KA Module

The table below lists what you can connect to the RM/KA module:

You can connect the module to:	Using channel:	
	RM	KA module
programming terminal	2A	2A
RS-232, RS-422, RS-423 devices (terminal or modem)	1	1
DH link	2B or 3	2B or 3
DH+ link	2B or 3	3B or 3

Check the appropriate worksheet for the RM/KA module to see which connections to make. To connect a programming terminal, see chapter 5. To connect an RS-232, RS-422 or RS-423 device to channel 1, follow these steps.

1. Depending upon the type of device you are connecting, use the pin assignments in [Table 4.B](#) through [Table 4.D](#) to construct a cable.

Table 4.B
RS-232 Pin Assignments¹

Pin:	Input to RM or KA/output from RM or KA module:	Description:
1	not applicable	chassis ground
2	output	transmitted data
3	input	received data
4	output	request to send
5	input	clear to send
6	input	data set ready
7	na	signal ground
8	input	received line signal detector
20	output	data terminal ready

¹Complies with the RS-232 standard as a DTE type-D interface.

Table 4.C
RS-422 Pin Assignments¹

Pin:	Input to RM or KA/output from RM or KA module	Description:
1	na	chassis ground
2	output	transmitted data
14	output	transmitted data ¹
3	input	received data
16	input	received data ¹
4	output	request to send
19	output	request to send ¹
5	input	clear to send
13	input	clear to send ¹
6	input	data set ready
22	input	data set ready ¹
7	na	signal ground
8	input	received line signal detector
10	input	received line signal detector ¹
20	output	data terminal ready
23	output	data terminal ready ¹

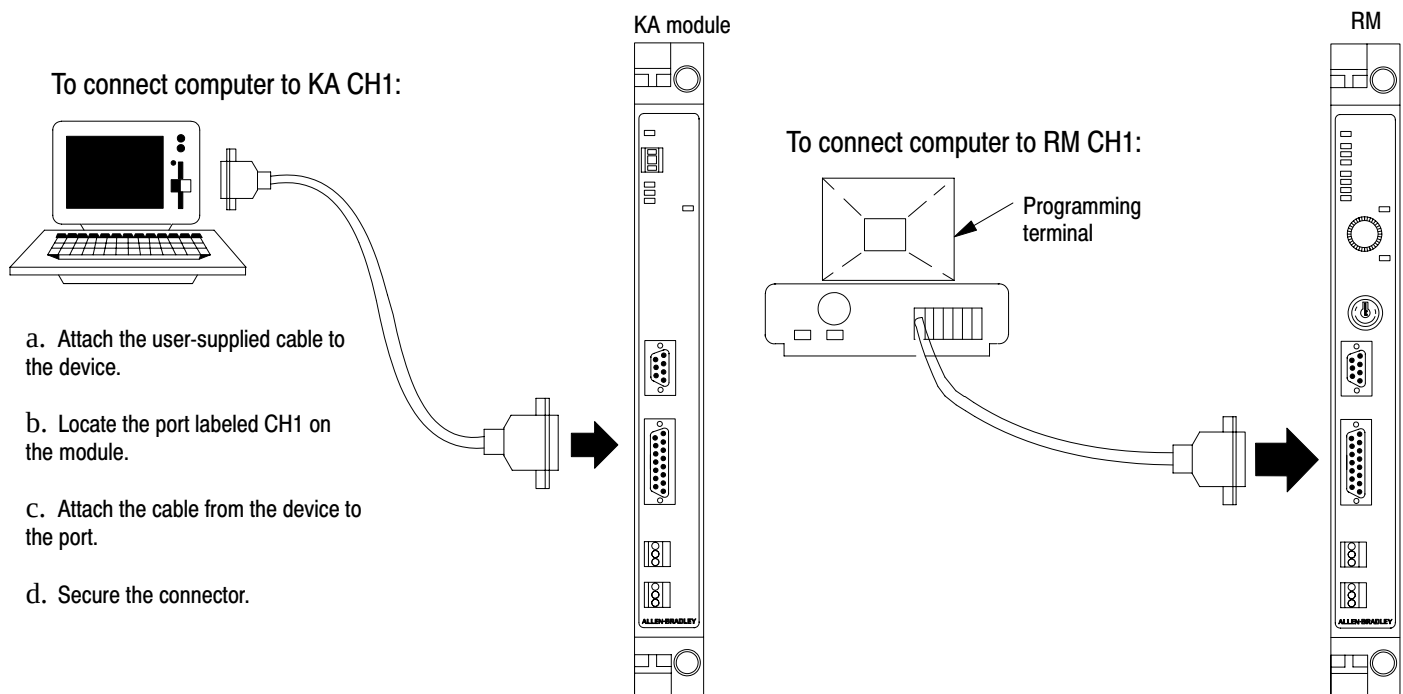
¹Compatible with RS-422 equipment as long as a point-to-point connection is used.

Table 4.D
RS-423 Pin Assignments¹

Pin:	Input to RM or KA/output from RM or KA module:	Description:
1	na	chassis ground
2	output	transmitted data
3	input	received data
4	output	request to send
5	input	clear to send
6	input	data set ready
7	na	signal ground
8	input	received line signal detector
14	not applicable	send common
16	na	receive common
20	output	data terminal ready

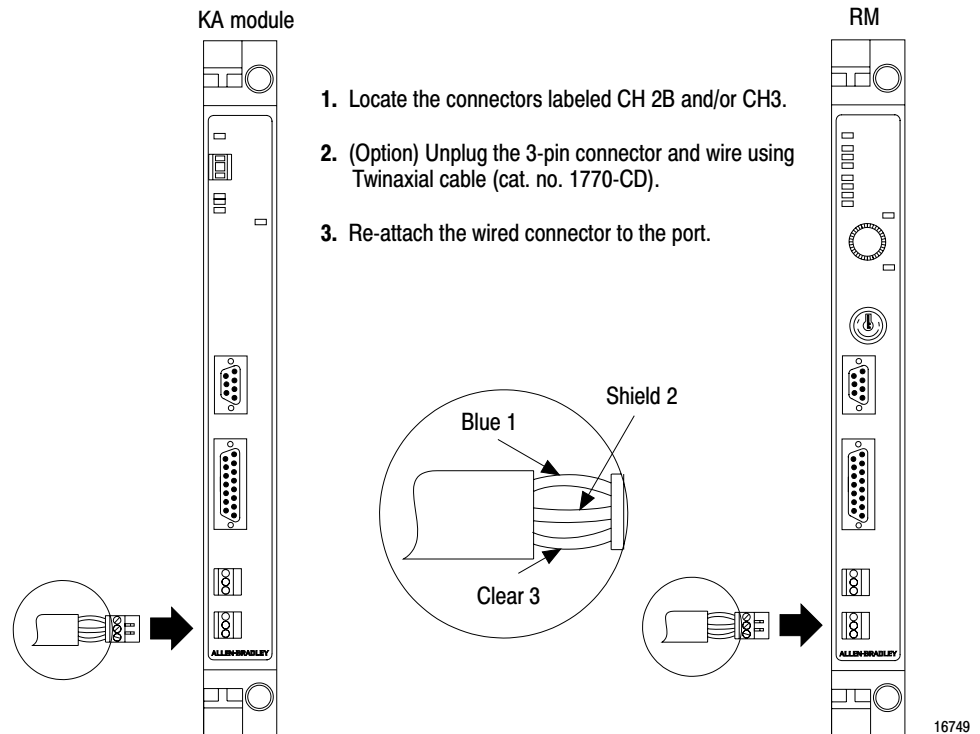
¹Compatible with RS-423 standard for the signals used.

2. Connect the device as shown below.



16748

To connect to DH or DH+ link, follow the steps below.



Set the Keyswitch (RM only)

Set keyswitch in the position indicated on the worksheet.

RS Module

To install the RS, use the worksheets as guides and complete the following:

- configure the termination resistors (RS2 only)
- install the RS in the chassis
- install the battery
- set the RS module address
- connect the RS to I/O

Configure the Termination Resistor (RS2 only)

This section tells you when to use:

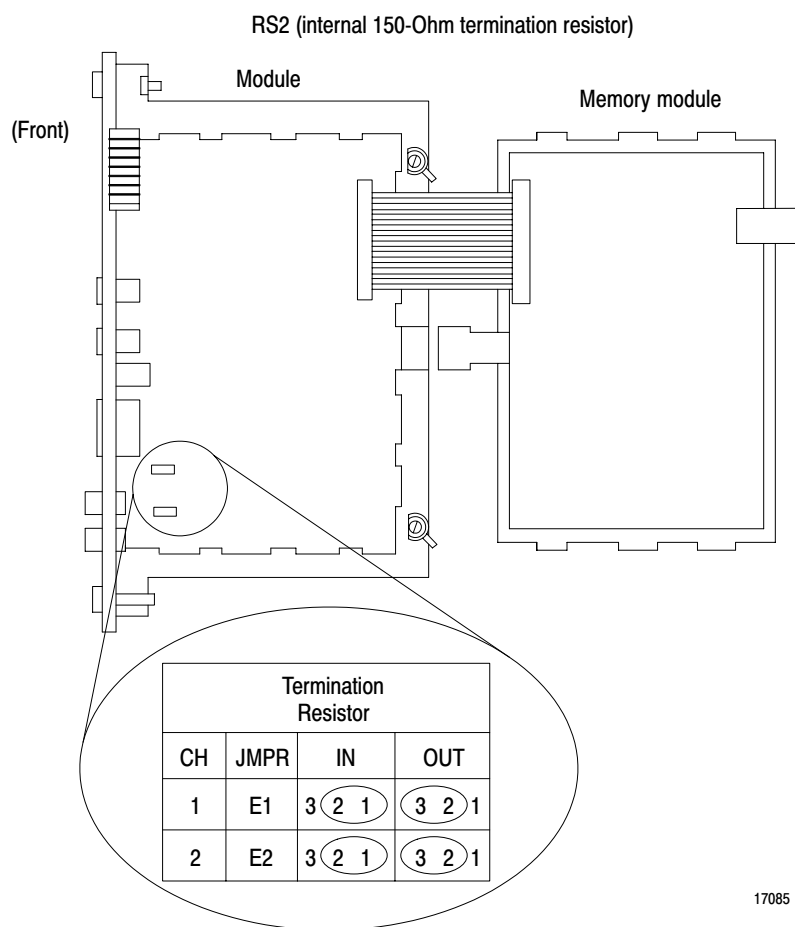
- internal 150-Ohm termination resistors for RS2 ([Figure 4.1](#))
- external 82-Ohm termination resistors (supplied with 5150-RS2)

Use [Table 4.E](#) to configure your termination resistors for RS2.

Table 4.E
Configure Termination Resistors for the RS2

If the transmission rate is:	And the scanner is physically located:	Then put the internal 150-Ohm termination-resistor jumper in the:
57.6k bit/s or 115k bit/s	middle of remote I/O link	out position
	end of remote I/O link	in position
230k bit/s	middle of remote I/O link	out position
	end of remote I/O link	out position, and attach 82-Ohm termination resistor between pins 2 and 3

Figure 4.1
RS2 Internal 150-Ohm Termination Resistors



Install the RS

Install the module as shown in appendix A.

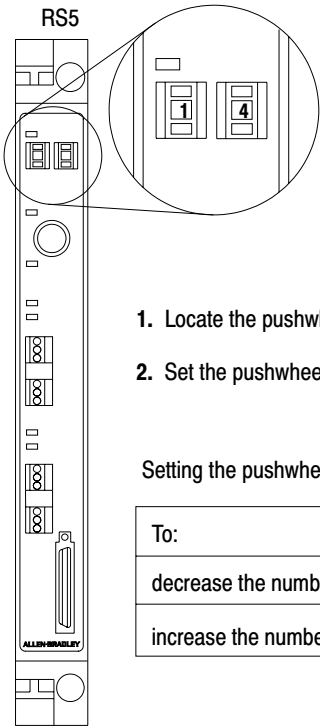
Install the Battery

To install the RS battery, see “Install the Battery” section on page [4-11](#) for instruction.

Set the RS Module Address

Follow the steps below to set the RS module address. For RS2, the address must start at 1 for the first RS and be consecutive for the other RS modules up to 4.

For RS5, the address can be spread among the RS modules, or all four addresses may be used on one RS5. The addresses must be consecutive.



1. Locate the pushwheel on the front panel of the RS.
2. Set the pushwheel as indicated on the worksheet.

Setting the pushwheel:

To:	Push the:
decrease the number	top button
increase the number	bottom button

19788

Connect I/O

To connect remote I/O to the ports labeled CH 1 to CH 4, and local I/O to CH5, see chapter 7.

The RS5 pushwheels:	Is equivalent to:
1-4	four RS2 modules' pushwheels.
1-1	one RS2 module's pushwheel.

LP Module

To install the LP, use the worksheet as a guide and complete the following:

- install the LP
- install the battery
- set the LP module address
- make connections to the module

Install the LP

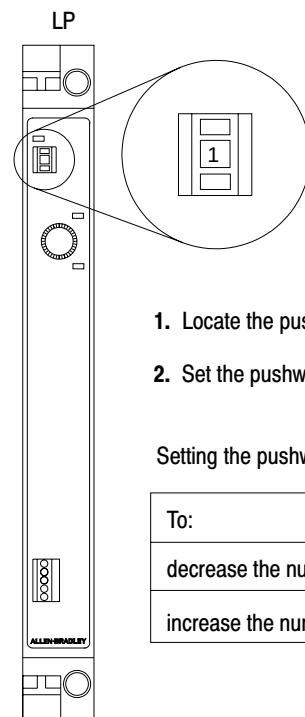
See appendix A to install the module in the chassis.

Install the Battery

To install the LP battery, see “Install the Battery” section on page [4-11](#) for instructions.

Set the LP Address

Follow the steps below to set the LP module address. The address must start at 1 for the first LP and be consecutive for the other LP modules up to 4.



1. Locate the pushwheel on the front panel of the LP.
2. Set the pushwheel as indicated on the worksheet.

Setting the pushwheel:

To:	Push the:
decrease the number	top button
increase the number	bottom button

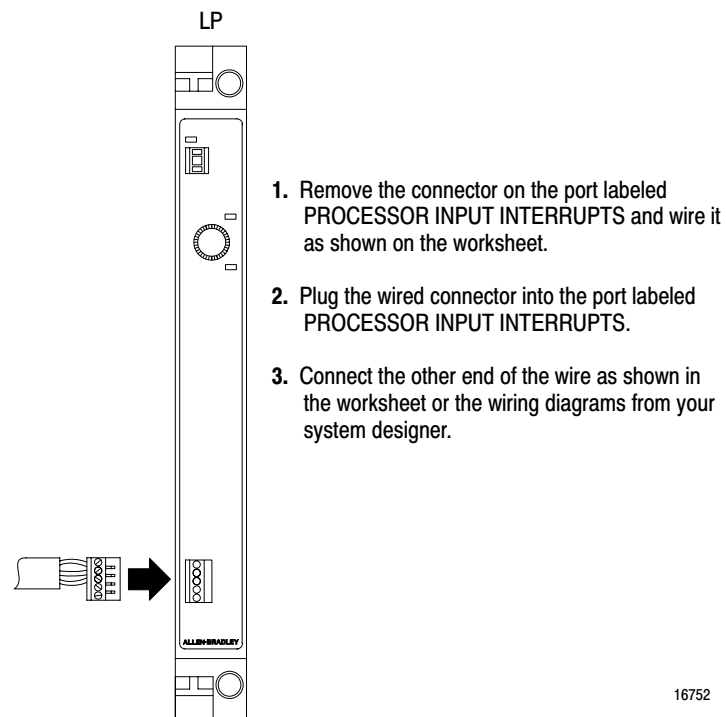
16751

Connect Processor Input Interrupts

Check the worksheet to see if you have to make this connection. If you do not have to make this connection, go to the next section. If you have to make this connection, use:

- 14-28 AWG wire
- strip .276" (7mm) insulation from the wire

Follow the steps belows to connect the Processor Input Interrupts.



16752

Vision Processor Modules

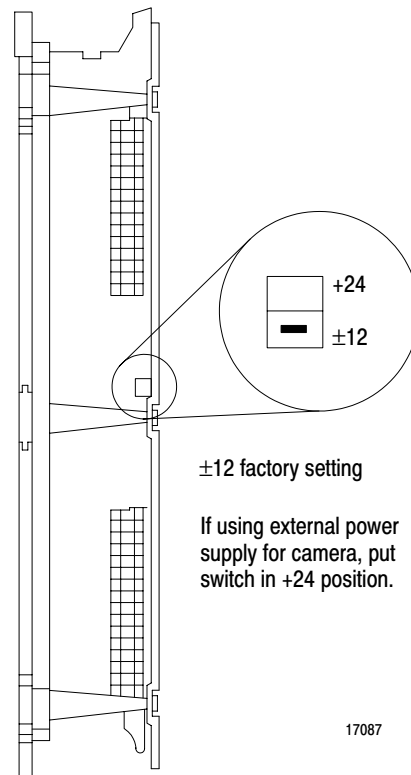
To install the CVIM module, CVIM2 module and Color CVIM module, use Worksheet 2.2 as a guide and complete the following:

- set the switch for camera power
- install the vision processor module in the chassis
- set the module address
- make connections to the module

Set Switch for Camera Power

Before you install the module, set the switch for camera power. It is factory set for ± 12 volts. If you are using an external power supply for the camera, set the switch to +24 volts as shown below.

Back of a CVIM module



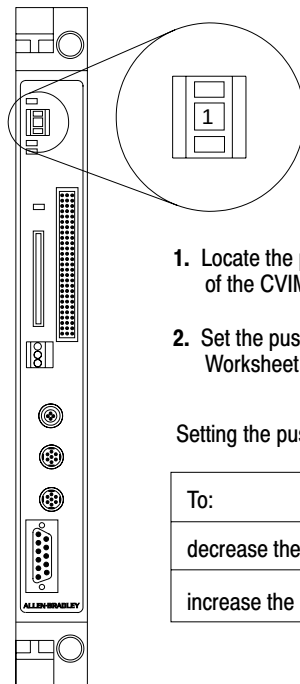
17087

Install the CVIM Module

See appendix A to install the module in the chassis.

Set the Module Address

Follow the steps below to set the module address.



1. Locate the pushwheel on the front panel of the CVIM module.
2. Set the pushwheel as indicated on Worksheet 2.2.

Setting the pushwheel:

To:	Push the:
decrease the number	top button
increase the number	bottom button

16753

MicroVAX Information Processors

Important: If you have a RM with firmware revision A04 or earlier and you're replacing a MicroVAX Processor, go to the section "Replace a MicroVAX Processor" on page [4-24](#).

To install the MicroVAX Information Processor, use the appropriate worksheet as a guide and complete the following:

- install the processor in the chassis
- install the battery
- set the keyswitch
- connect Ethernet and make other connections to the module
- replace the module (if applicable)

Install the Processor

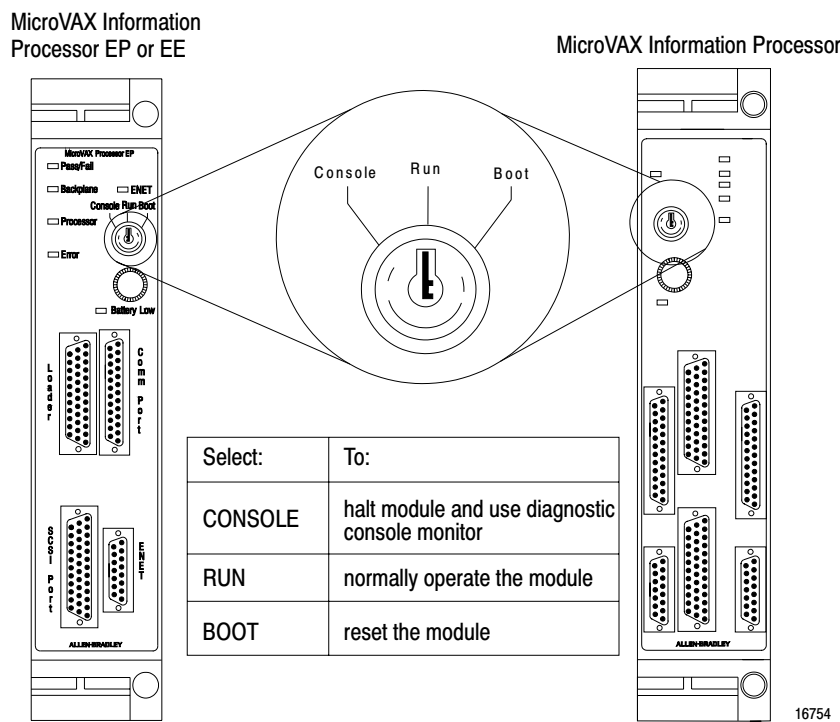
See appendix A to install the processor in the chassis.

Install the Battery

To install the MicroVAX Information Processor battery, see “Install the Battery” section on page 4-11 for instruction.

Set the Keyswitch

Set the keyswitch as indicated on the processor’s worksheet.

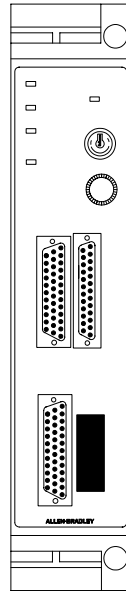


16754

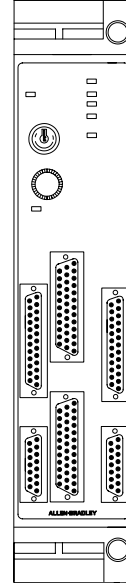
Connect Ethernet

To connect the processor to Ethernet, follow these steps:

MicroVAX processor EE or EP



MicroVAX Information Processor



1. Run the Ethernet cable to the processor as indicated in your system designer wiring diagrams.
2. Locate the port on the processor labeled ENET CH # (for MicroVAX Information Processor EE or EP) or ENET CH A (for MicroVAX Information Processor) and attach the Ethernet cable to the port.
3. Secure the connector.



16755



ATTENTION: The Ethernet connection must be secure while the PI system is controlling equipment; otherwise, the MicroVAX Information Processor may shut down the system's power supply.

If the system power shuts down, follow these steps:

1. Make sure the Ethernet connection is secure.
2. Cycle power by turning off the power from the power supply and turning it on again.

Make Connections to the Processor

To make the following connections to the processor, see chapter 5.

- the 4-port distribution panel
- the program loader
- an industrial disk

Replace a MicroVAX Information Processor

If you have a RM with firmware revision A04 or less and you are replacing a 5730-CPU1 processor with either a MicroVAX Information Processor EE or EP, or an EI module, follow the steps below.

1. Save the program image with the original module installed.
2. Power the system down.
3. Remove the module you are replacing.
4. Restore power.
5. Clear memory using 6200 series software.
6. Power the system down.
7. Install the new processor.
8. Restore power.
9. Restore the saved image to the PI system.

EI Module

Important: If you have a RM with firmware revision A04 or earlier and you're replacing a 5730-CPU1 processor with an EI module, go to the above section "Replace a MicroVAX Information Processor."

To install the EI module, complete the following:

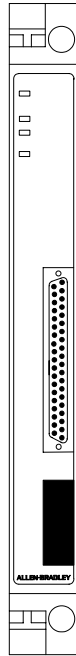
- install the EI module in the chassis
- connect Ethernet and make other connections to the module
- check jumper settings
- replace the module (if applicable)

Install the EI Module

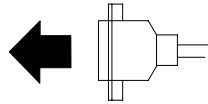
See appendix A to install the module in the chassis.

Connect Ethernet

To connect the module to the Ethernet, follow the steps below.



1. Run the Ethernet cable to the processor as indicated in your system designer wiring diagrams.
2. Locate the connector on the EI module labeled ENET and attach the Ethernet cable to the connector.
3. Secure the connector.



18543

Important: If you're not using a powered transceiver, make sure the Ethernet connection is secure before cycling power.



ATTENTION: The Ethernet connection must be secure while the PI system is controlling equipment; otherwise, the EI module may shut down the system's power supply.

If the system power shuts down, follow these steps:

1. Make sure Ethernet connection is secure.
2. Cycle power by turning off the power from the power supply and turning it on again.

Ethernet Heartbeat

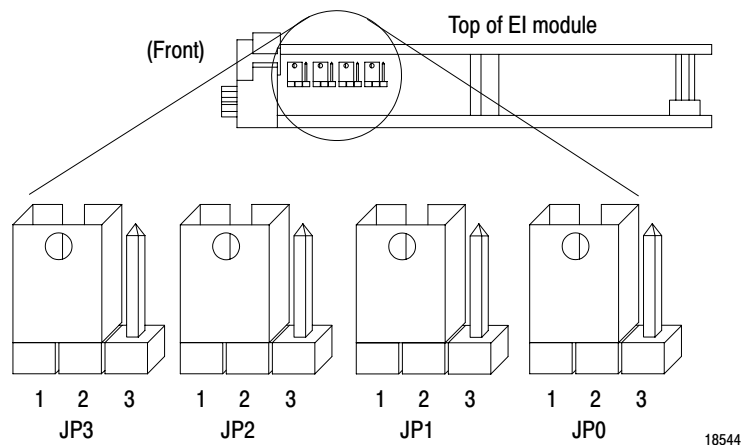
The EI module requires the IEEE 802.3 SQE (Signal Quality Error) test (also known as Ethernet heartbeat). Make sure your Ethernet transceiver is set with the SQE test enabled. For more information about the SQE test, see the documentation that came with your transceiver.



ATTENTION: Do not use a transceiver that has a disabled SQE test to connect an EI module to an Ethernet network because it could disrupt network activity.

Check Jumper Settings

The jumpers on the EI module are factory set. Make sure the jumpers are set as shown below.



OSI Carrierband/Broadband Interface Module

To install the OSI interface module, use the worksheets as guides and complete the following:

- set the switches
- install the module in the chassis
- install the battery
- set the pushwheel
- make connections to the module

Set the OSI Interface Switches

Set the OSI interface module's switches for:

- operating modes (switch 1)
- communication defaults (switch 2)



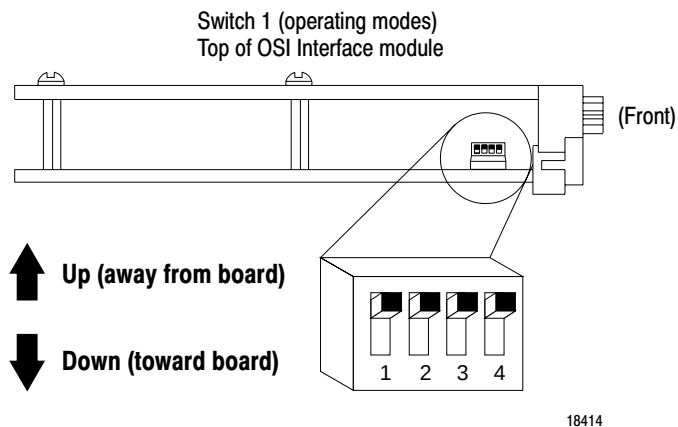
ATTENTION: If you perform operations on a module improperly, you may cause an electrostatic discharge, which can damage the module. Perform internal operations, such as setting the jumpers, only in static-safe environment.

Follow these steps to set the switches.

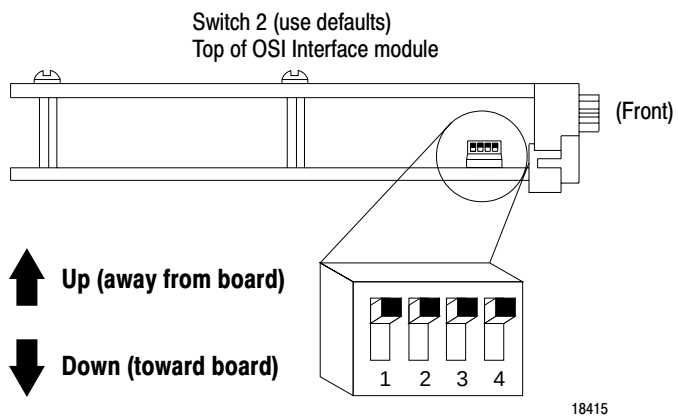
Important: Set the switches before you put the module in the chassis and power up.

Set Switch Bank

1. Set switch 1 as shown on the worksheet.



2. Set switch 2 as shown on the worksheet.



Important: Leave switches 3 and 4 in the up position.

Install the OSI Interface Module

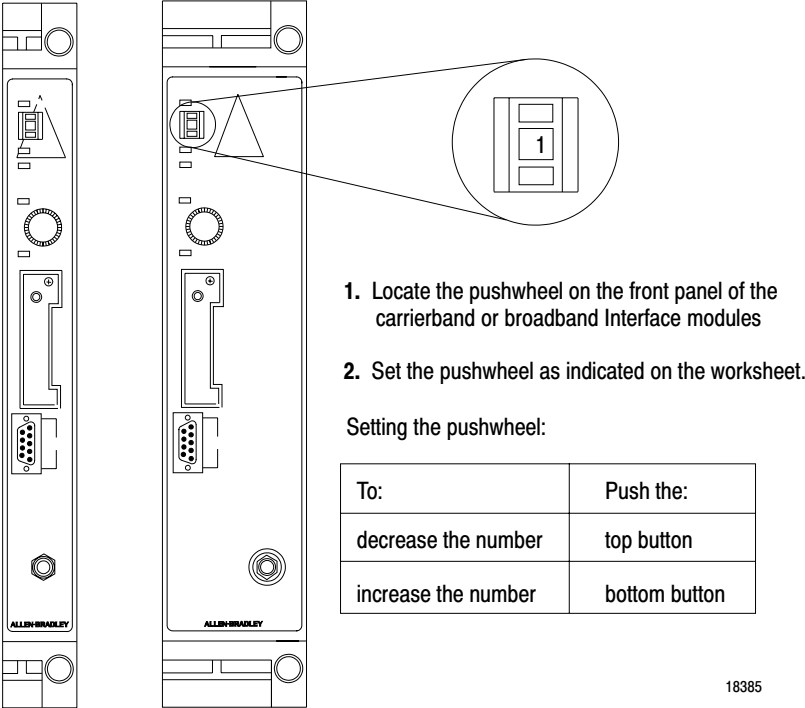
Install the module as shown in appendix A.

Install the Battery

To install the OSI interface module battery, see page [4-11](#).

Set the OSI Interface Module Pushwheel Address

Follow the steps below to set the OSI interface module's pushwheel address. If you have more than one OSI interface module in the same chassis, set the pushwheels sequentially; make sure you set the first OSI interface module's pushwheel to 1.



Connect the OSI Interface Module

The table below lists what you can connect to the OSI interface module.

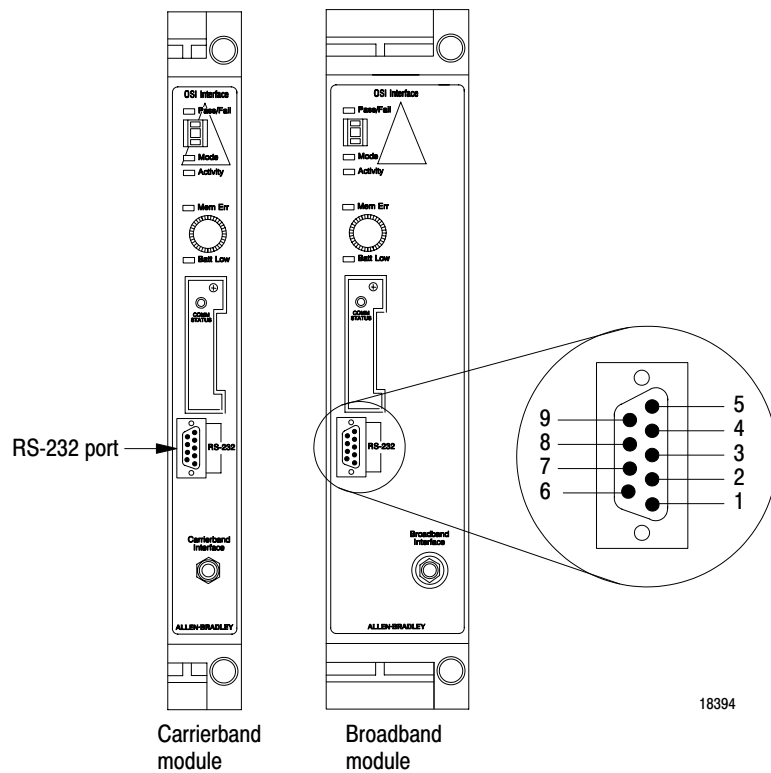
You can connect the module to:	Using connector/port:
A-B MAP Station Manager (communicates locally as well as through the network)	carrierband or broadband
PLC-3 [®] controller	
PI system	
Third-party device	

Check the worksheet to see which connections to make. To connect to a programming terminal running A-B MAP Station Manager software, see chapter 5. To connect an RS-232 device, follow the steps below and see [Figure 4.2](#).

- Using the pin-outs in the table below, construct a cable depending upon the type of device you are connecting. The OSI interface module's RS-232 port is configured as a DCE port.

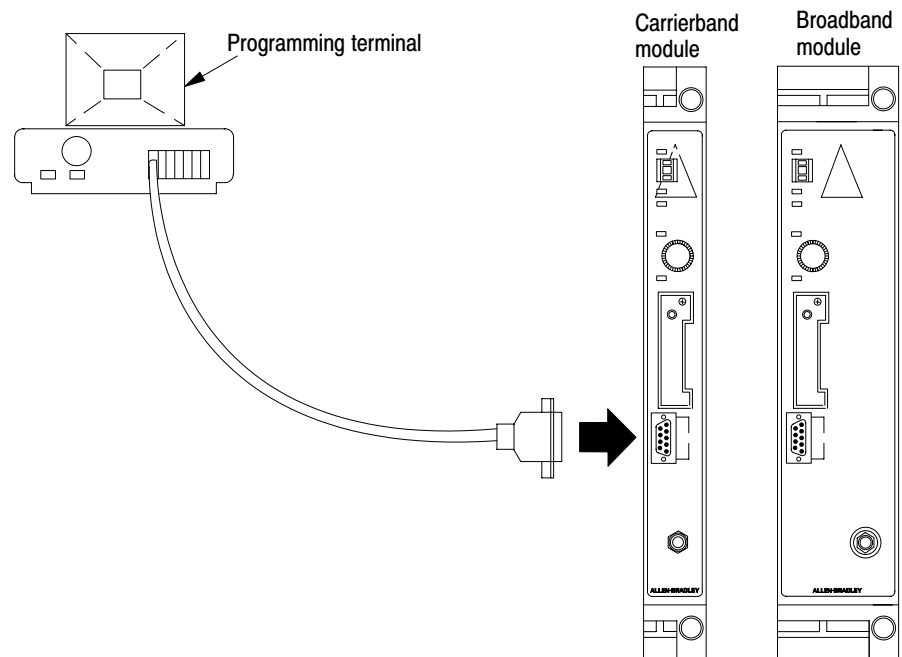
RS-232C	
Pin:	Signal:
1	reserved. The reserved signals are for future use and shouldn't be wired to. The OSI Interface's RS-232 port does not supply a shield connection.
2	TXD
3	RXD
4	reserved
5	signal ground
6	reserved
7	reserved
8	reserved
9	reserved

Figure 4.2
Pin Assignments for the 9-Pin RS-232 Connector



- If you want to use a shielded RS-232 cable, wire the shield:
 - at the other end of the cable or
 - via an RS-232 connector with a metal hood

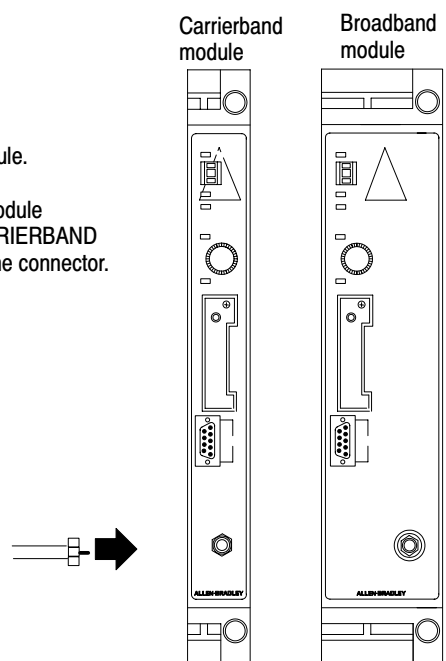
3. Connect the device as shown below.



18391

To connect to carrierband/broadband, follow the steps below.

1. Run the MAP cable to the module.
2. Locate the connector on the module labeled BROADBAND or CARRIERBAND and attach the MAP cable to the connector.
3. Secure the connector.



For more information on broadband or carrierband cabling specifications, call General Motors Photographic (313) 422-2900 and ask for:

- MAP/TOP Broadband Specification
- MAP/TOP Carrierband Specification

Important: These are not A-B publications.

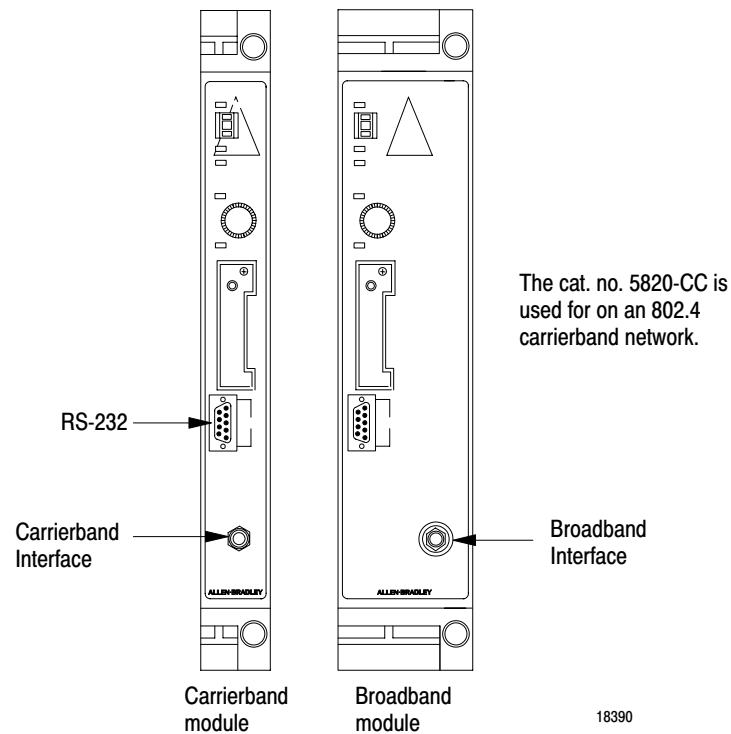
Configuring the PI OSI Interface Module

This section shows you how to configure the OSI interface module.

You need:

- a programming terminal that has already been configured as an A-B MAP Station Manager
- a RM that has been configured using the information in chapter 3
- PI OSI interface module software (cat. no. 5820-OS)
- *Allen-Bradley MAP Station Manager Software User's Manual* (6630-6.5.2)
- *Pyramid Integrator OSI Interface Software User's Manual* (5820-6.5.1)

Figure 4.3
OSI Interface Module Communication Ports



Broadband versions of the OSI interface module transmit and receive on the following frequency channel pairs:

Cat. no.:	MAP channel:	Transmit channel:	Transmit frequency:	Receive channel:	Receive frequency:
5820-CBA	A	3'/4'	59.75 – 71.75 MHz	P/Q	252 – 264 MHz
5820-CBB	B	4A'/5'	71.75 – 83.75 MHz	R/S	264 – 276 MHz
5820-CBC	C	6'/FM1	83.75 – 95.75 MHz	T/U	276 – 288 MHz

OSI Interface

To install the OSI interface module, complete the following:

- make sure slot time is consistent with other nodes on the 802.4 network. A-B defaults to 80 decimal (50 HEX)
- perform system load
- check default settings
- specify switch settings (see chapter 7 of the *PI Design Manual* (5000-6.2.1) for more information.)

Slot Time

The default slot time is 80 decimal (50 HEX). To change slot times:

- use the local interface capability of A-B MAP Station Manager
- see *A-B MAP Station Manager Software User's Manual*
- see *PI OSI Interface Software User's Manual*

System Load

See both the *A-B MAP Station Manager Software User's Manual* and the *PI OSI Interface Software User's Manual* for information on system loading.

Configurable Parameters

All OSI-related configurable parameters have factory-default settings that work for most networks. If you need to change any of these default settings, see:

- *A-B MAP Station Manager Software User's Manual*
- *PI OSI Interface Software User's Manual*

Specify Switch Settings on the OSI Carrierband/Broadband Interface Module

Switch:	Position:	Description:
1	up	if there is a valid image in non-volatile memory, the OSI interface module will enter fully operational mode after: • a power cycle, regardless of the mode preceding the power cycle • you enter a reset command from the A-B MAP Station Manager, regardless of the mode preceding the reset • you enter a change mode to Fully Operational from the A-B MAP Station Manager if there is not a valid image in non-volatile memory, the OSI interface module will not enter fully operational mode but will enter Partially Operational mode.
	down	the OSI interface module will enter partially operational mode after: • a power cycle, regardless of the mode preceding the power cycle • you enter a reset command from the A-B MAP Station Manager, regardless of the mode preceding the reset • you enter a change mode to Partially Operational from the A-B MAP Station Manager
2	up	the OSI interface module uses user defaults, if available, at power-up or reset (see the <i>PI OSI Interface Software User's Manual</i> for a list of user defaults). If user defaults aren't available, the interface will use A-B communication defaults.
	down	the OSI interface module uses A-B communication defaults at power-up or reset.
3	preset at A-B	reserved (do not change)
4	preset at A-B	reserved (do not change)

Important: Keep switches 3 and 4 in the up position; otherwise, the PI system stays in a power cycle.

Installing the Peripherals

Chapter Objectives

This chapter describes how to install the following peripherals:

- programming terminal
- 209, 418, or 480 Mbyte industrial disk (5710-ID4, -ID5, -ID6, -ID7)
- 159Mbyte industrial disk (5730-ID3)
- 4-port distribution panel (5710-DPI)
- program loader (5710-PL/B)

Where to Begin

The table below lists the page numbers for installation procedures.

To complete installation of:	See page:
programming terminal	5-1
industrial disk	5-2
4-port distribution panel	5-9
program loader	5-9

If you are installing an industrial disk and/or a distribution panel, make sure you have mounted and grounded these components as shown in chapters 2 and 3.

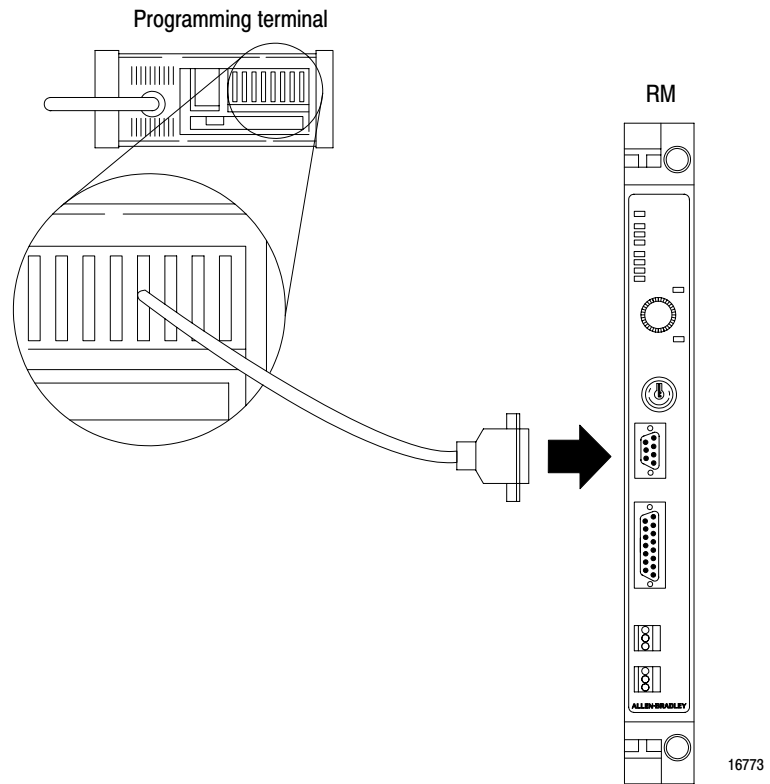
Important: Save the packing material in case you have to ship a disk.

Install a Programming Terminal

If you are connecting a programming terminal to the RM, follow these steps.

1. Install a DH+ Interface Board (cat. nos. 1784-KT,-KTK1) in the programming terminal.
2. Use the appropriate interconnect cable to connect the interface board to the terminal as shown below. For more information on interconnect cables, see appendix C.

To connect a programming terminal to RM/KA module, follow these steps.



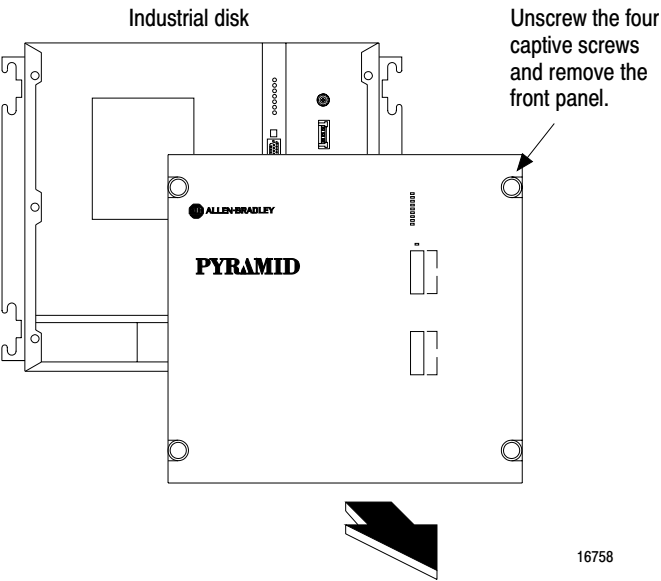
Install the Industrial Disk

To install the industrial disk, perform the following tasks:

- set the operating voltage
- set the address (for 5710-ID4, -ID5 only)
- wire an out-of-temperature shutdown warning device (optional)
- wire the industrial disk for ac power
- connect the industrial disk to the MicroVAX Information Processors
- connect the industrial disk to second industrial disk (optional)
- connect a terminator on the last disk

Remove the Front Panel

To set the operating voltage and wire the disk you have to access the inside of the industrial disk's chassis. To access the inside of the industrial disk's chassis, remove the front panel as shown below.



Set the Operating Voltage and SCSI Address

The operating voltage is factory set to 230V ac and can be changed to 115V ac.

To set the:	On:	See:
operating voltage	5730-ID3, 5710-ID6, 1-ID7	Figure 5.1
operating voltage and address	5710-ID4, -ID5	Figure 5.2

Figure 5.1
Set Operating Voltage on a 159Mbyte Industrial Disk

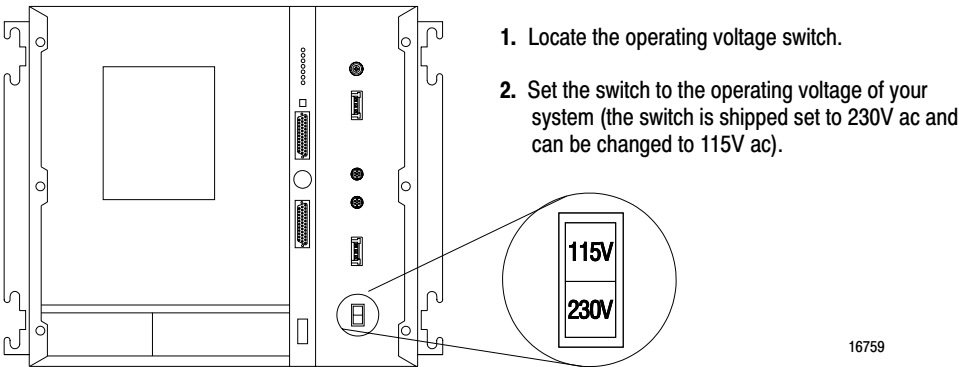
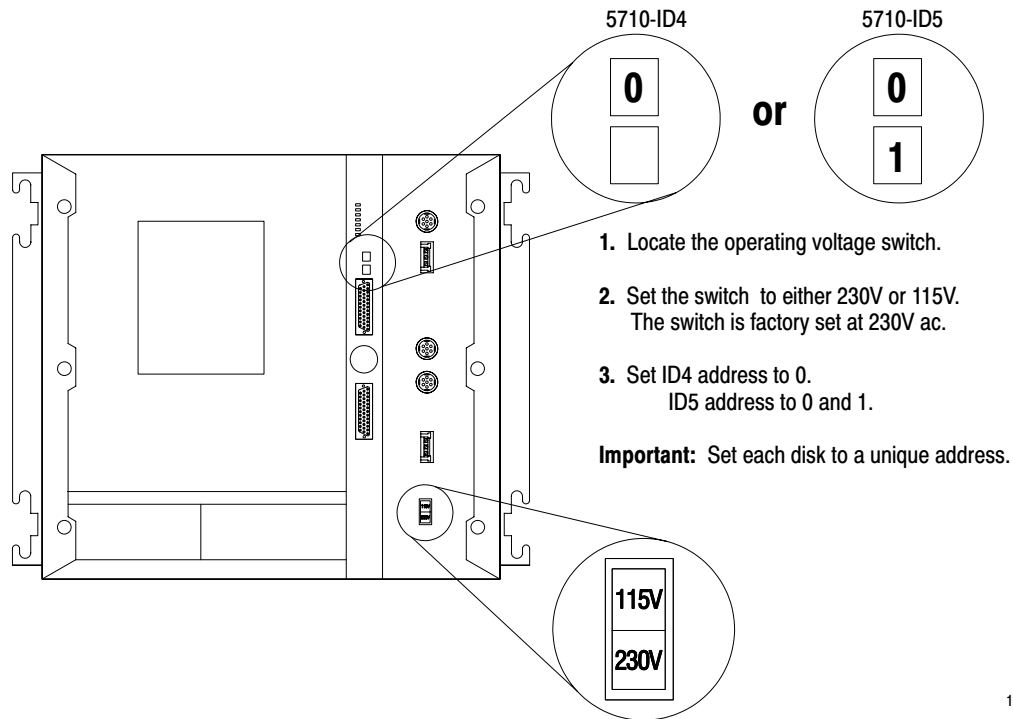


Figure 5.2
Set Operating Voltage and Address on a 209Mbyte or 418Mbyte Industrial Disk



ATTENTION: The 5710-ID6 has SCSI bus address preset to 0 and 1. The 5710-ID7 has SCSI bus address preset to 2 and 3. These values are not configurable.

Wire an Out-of-Temperature Warning Device

If you are not going to wire this device, you can skip this section. Check the disk information from your system designer. It should tell you if you are going to make this connection and if so, what device you are going to connect.

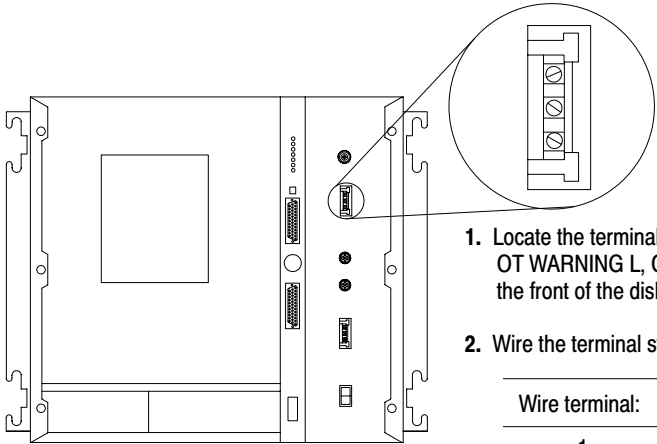
Important: For industrial disk cat. no. 5730-ID3, this function is not available on early revisions with part numbers 532029301 and 532029302.

If the disk's external environment temperature falls below 0°C or exceeds 60°C and remains so, you have no less than 9 minutes to orderly shut down the system. After 9 minutes, the disk shuts itself down and data may be lost.

The signal is an open collector output capable of sinking 48ma. The signal is low true when:

- the disk's external environment temperature is below 0°C or above 60°C
- the processor that controls the disk drive's environment has faulted

Follow the steps below to wire a warning device.



1. Locate the terminal strip labeled N.C., OT WARNING L, OT WARNING RET on the front of the disk.

2. Wire the terminal strip as indicated below:

Wire terminal:	To:
1	no connection
2	OT WARNING L
3	OT WARNING RET

3. Connect the other end of the wires to the appropriate device.

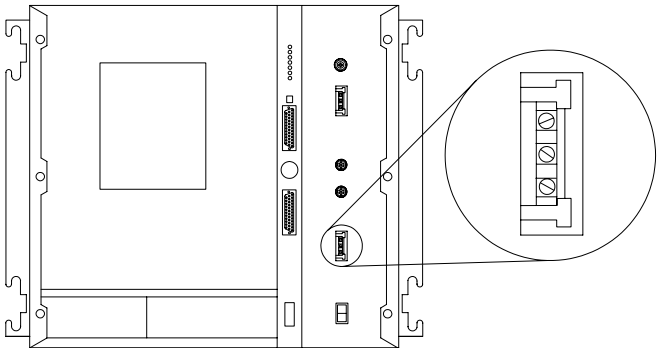
16760

Wire the Disk for ac Power

The disk connects to ac power. The input ranges for the disk are:

- 90 to 132V ac or 180 to 264V ac
- 47 to 63 Hz

Follow these steps to wire the disk for ac power. **Do not connect** the other end of the cable to ac power yet. You will make that connection in chapter 9.



1. Locate the terminal block labeled L1, L2/N, GND on the front of the disk.

2. Wire the terminal strip as indicated below:

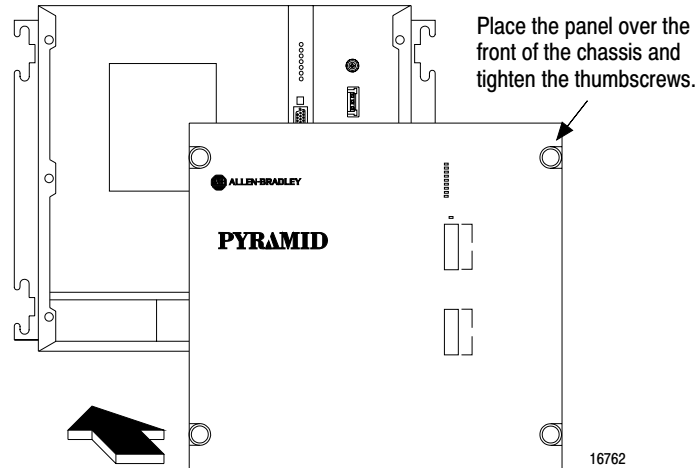
Wire terminal:	To:
L1	L1
L2/N	L2 Neutral
GND	Equip GND*

* Do not wire if you used a chassis ground.

16761

Reattach the Front Panel

You can now re-attach the front panel of the disk as shown below.



Connect the MicroVAX Information Processors

Connect the disk to the MicroVAX Information Processor as shown in Figure 5.3 or Figure 5.4. Connect either a one meter cable (5710-SDC) or a two meter cable (5710-SSA).

Figure 5.3
Connecting a 159Mbyte Industrial Disk

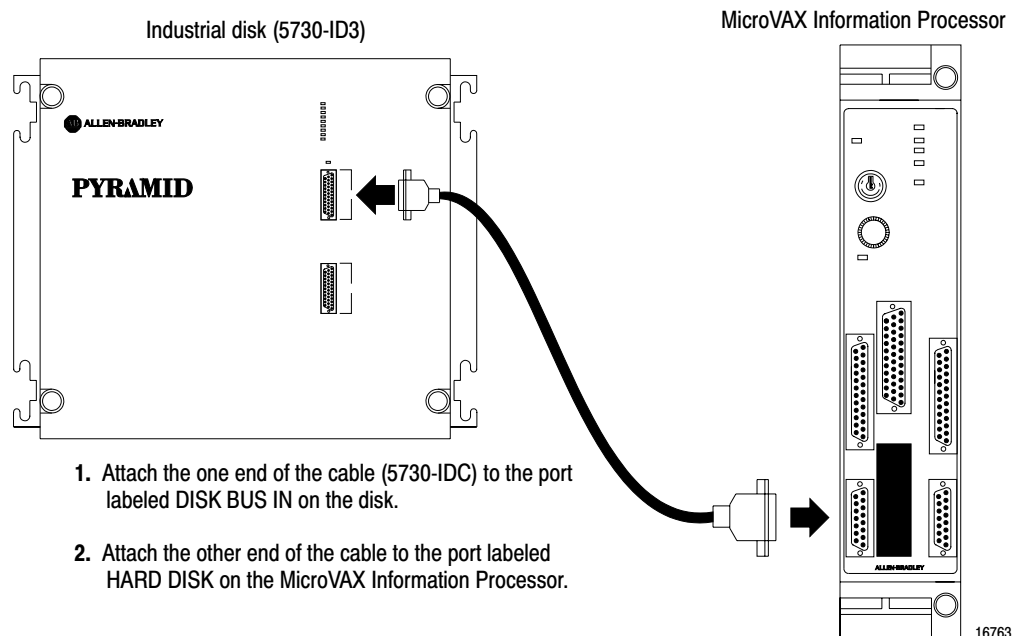
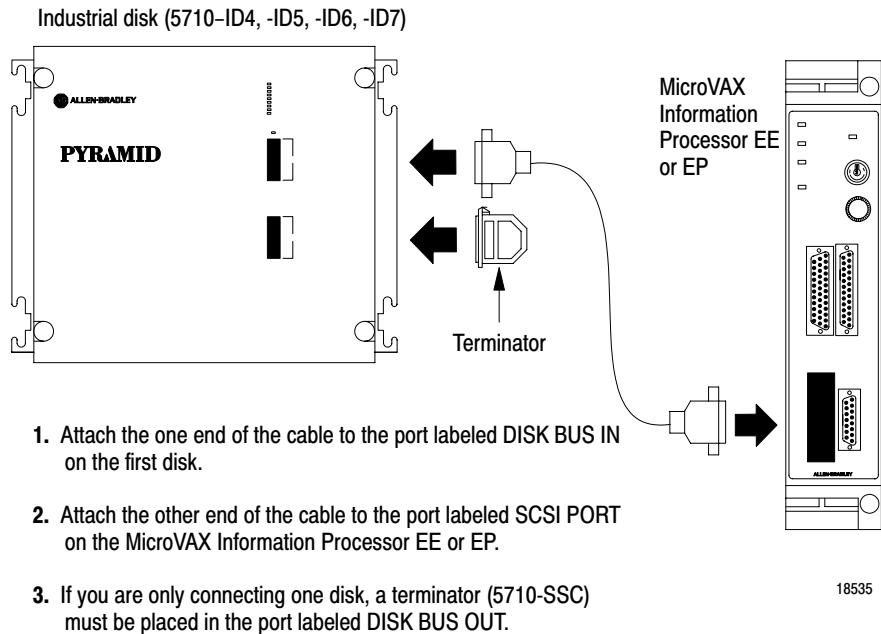


Figure 5.4
Connecting a 209Mbyte, 418Mbyte or a 480Mbyte Industrial Disk



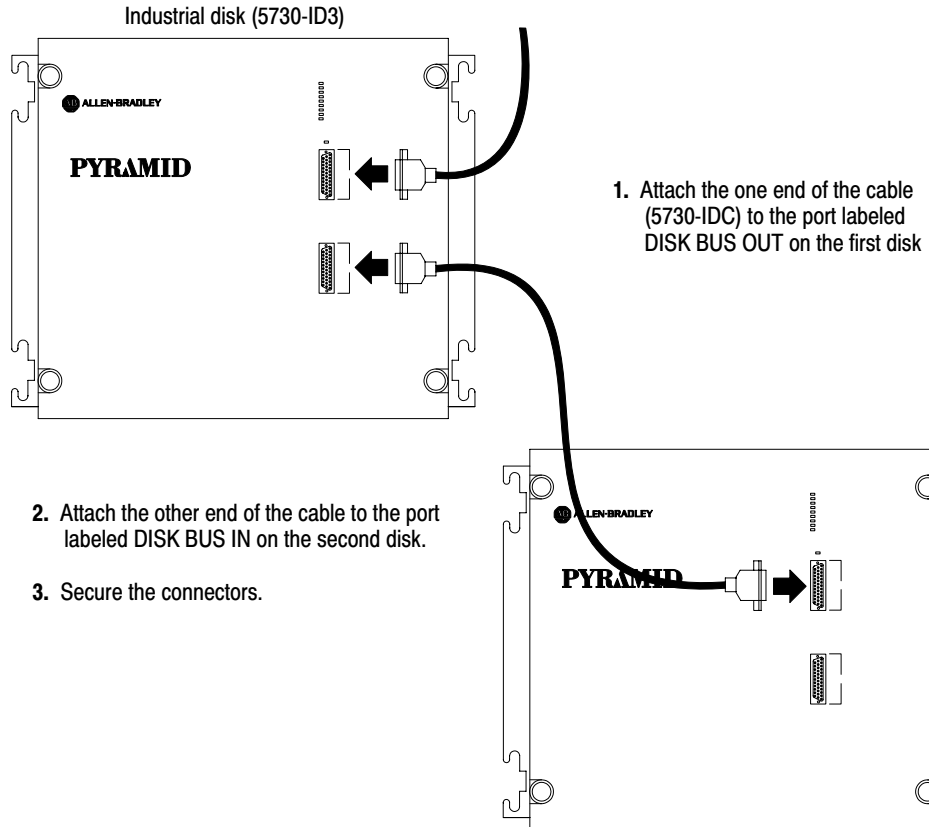
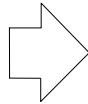
Connect Second Disk

Check your documentation to see if you are to connect a second disk.

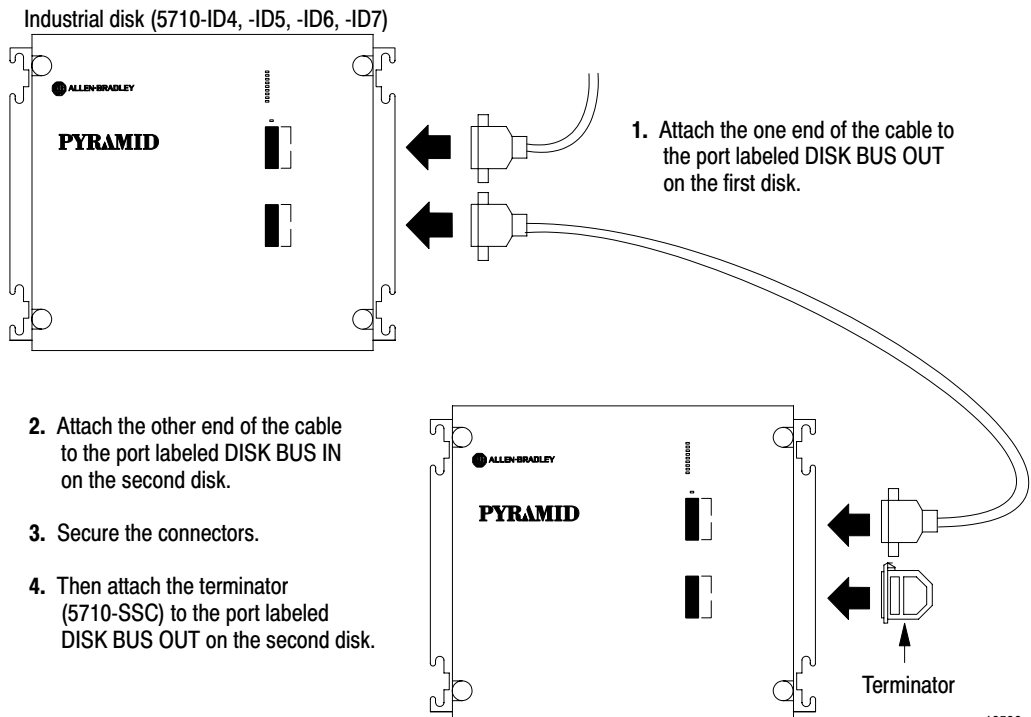
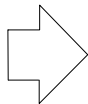
If you are:	Then:
Connecting a second disk	follow the steps below.
Not connecting a second disk	go to the next appropriate section.

Connect either a one meter cable (5710-SDC) or a two meter cable (5710-SSA).

Do this if you are
connecting a
159Mbyte industrial
disk to the MicoVAX
Information Processor



Do this
if you are
connecting a
209Mbyte,
418Mbyte, or a
480Mbyte
industrial disk to
the MicoVAX
Information
Processor



Install the 4-Port Distribution Panel

To connect the 4-port distribution panel, follow the steps below.

1. Route the cable from the back of the distribution panel to the information processor.
2. Using the following pin-outs table to construct a cable for the device that will connect to the panel.

Port 0		Port 1		Port 2		Port 3	
Pin	Signal	Pin	Signal	Pin	Signal	Pin	Signal
2	TXD0	2	TXD1	2	TXD2	2	TXD3
3	RXD0	3	RXD1	3	RXD2	3	RXD3
7	SIG GND	7	SIG GND	4	RTS2 ¹	7	SIG GND
				5	CTS2 ¹		
				6	DSR2		
				7	SIG GND		
				8	DCD2 ¹		
				20	DTR2		
				22	RI ¹		

¹ 5731-CPU1 and 5731-CPU2 do not support line signals.

3. Connect the cable to the MicroVAX Information Processor's port labeled Comm Port (5731-CPU-1, CPU-2) or Serial CH A (5730-CPU1).
4. Connect the device to the distribution panel.
 - a. Attach one end of the cable you made to the appropriate connector on the distribution panel (port 3 is the console port).
 - b. Attach the other end of the cable to the device.

Install the Program Loader

The program loader connects to the MicroVAX Information Processor. Connect the program loader before you boot the system. To connect the program loader, follow the steps below.

1. Plug in the program loader.
2. Run the cable with the 50-pin, D-shell connector from the program loader to the MicroVAX Information Processor.
3. Connect the 50-pin, D-shell connector to the port labeled LOADER on the MicroVAX Information Processor.

For more information on the program loader, see the *Program Loader Installation Data* (5000-2.93).

What to do Next

After you have completed installing the peripherals,

If you are installing:	Go to chapter:
vision components	6
I/O	7

Installing the Vision Components

Chapter Objectives

This chapter shows you how to install your vision components. If you are not installing a vision system, go to the next chapter.

Installing the Vision System

To complete the installation of your vision components, you connect the:

- I/O interface box
- user interface box
- camera to the CVIM module
- I/O board
- CVIM module to a remote I/O link (optional)

Before You Begin

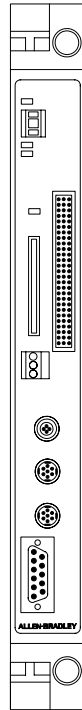
Make sure you have mounted and grounded the following components as shown in chapters 3 and 4:

- monitor (2801-N6,-N8,-N9,-N20)
- I/O board (1771-JMB)
- I/O interface box (2801-N21)
- user interface box (2801-N22)

Connect the I/O Interface Box

To connect the I/O interface box (2801-N21) to the CVIM module, follow these steps:

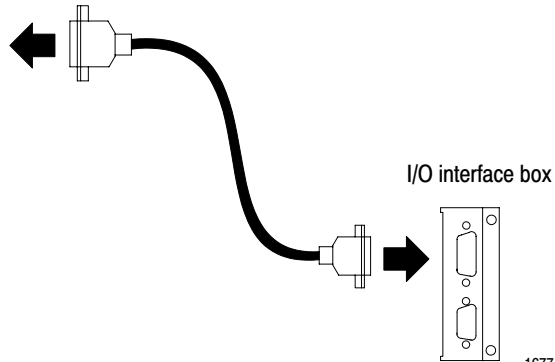
CVIM module



1. Connect the cable (2801-NC17) to the CVIM port labeled MODULE I/O.

2. Run the cable to the CVIM as indicated in the wiring documentation.

3. Connect the cable to the port labeled CVIM on the I/O Interface box.



16774

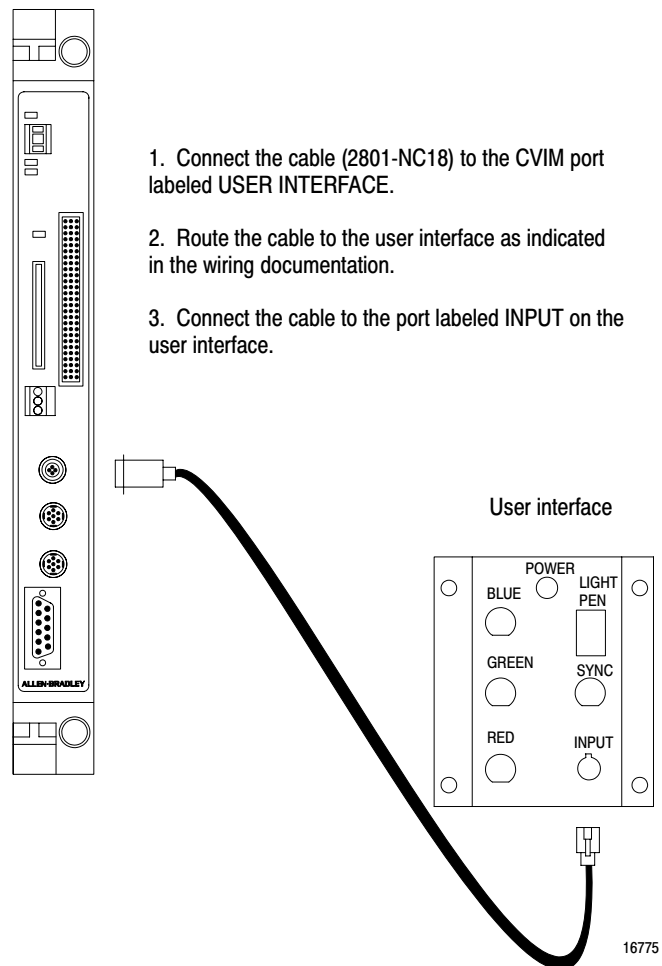
Connect the User Interface Box

To connect the user interface box (2801-N22) to the:

- CVIM module
- color monitor (2801-N8) or black and white monitor (2801-N6, -N9, -N20)
- light pen (2801-N7)

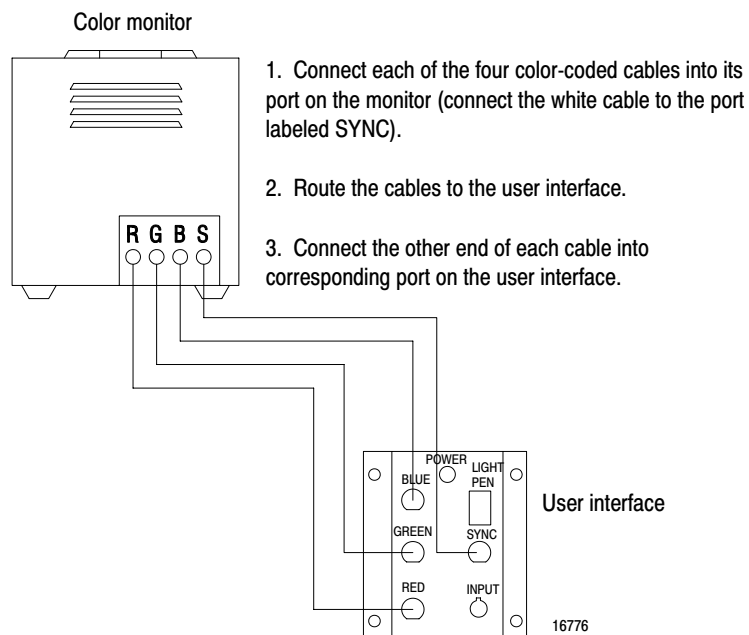
CVIM Module

To connect the CVIM module, follow these steps:



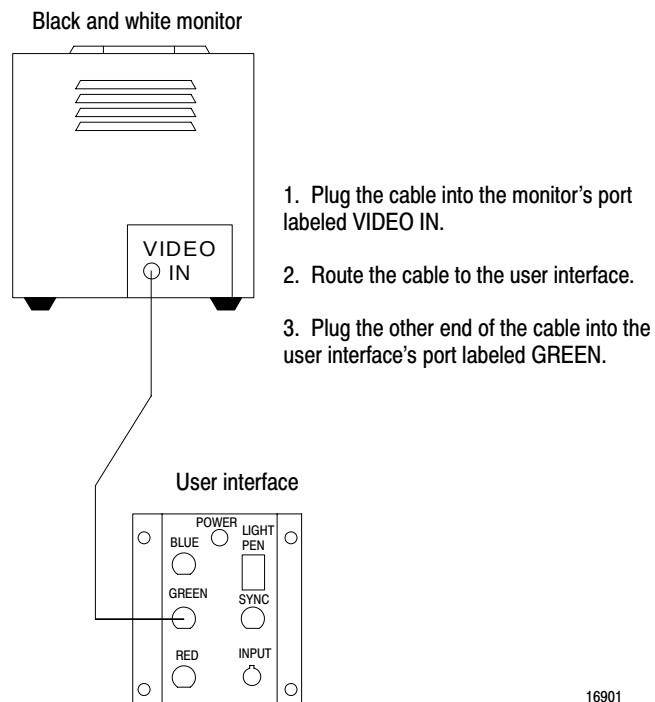
Color Monitor

To connect the color monitor, follow the steps below.



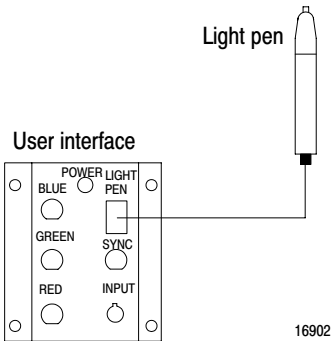
Black and White Monitor

To connect the black and white monitor, follow the steps below:



Light Pen

To connect the light pen, connect the light pen's cable to the user interface's port labeled LIGHT PEN as shown below.



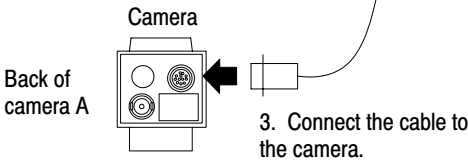
Connect the Camera to the CVIM Module

To connect the camera to the CVIM module, follow the steps below. Follow this procedure for each camera you connect to the CVIM module.

1. Connect the cable to the module.

If connecting camera:	Use one of these cable:
2801-YB	2801-NC5, -NC6, -NC7
2801-YC	2801-NC13, -NC14, -NC15, -NC16
2801-YD	2801-NC15, -NC16, -NC17

2. Route the cable from the VISION PROCESSOR to the camera as described in the wiring information.

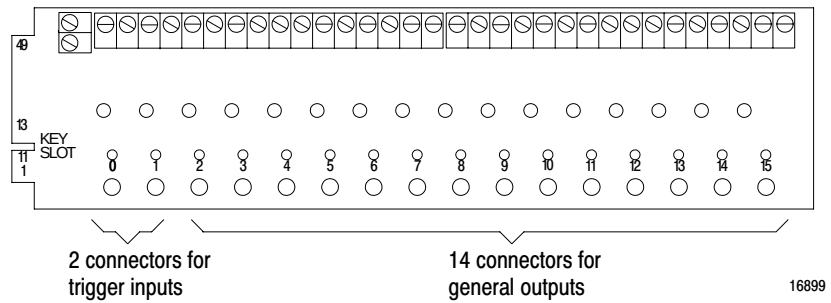


3. Connect the cable to the camera.

Connect the I/O Board

You can connect up to 16 I/O modules to the I/O board (1771-JMB). Check your vision documentation to see which connections you have to make and follow the steps below.

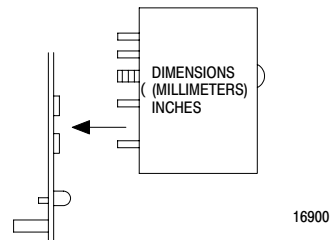
1. Gather the I/O modules you are to install.



2. Attach each I/O module to the I/O board.

1. Push the I/O module into its connectors (see your system designer vision information).

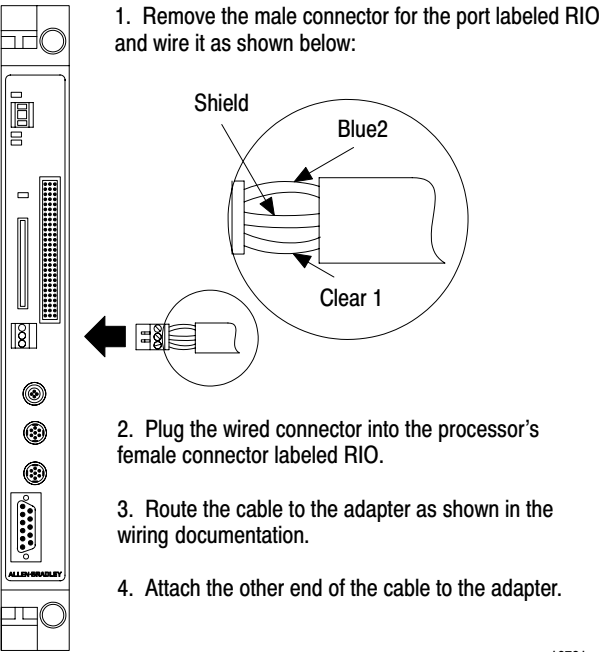
2. Using a phillips screwdriver, secure the connection by tightening the module's screw.



3. Wire the terminal strip as indicated in your system designer vision documentation.

Connect to Remote I/O Link

If you have to make this connection, use the steps below to attach the cable to the module using Belden 9463 cable.



What to do Next

After completing the installation of your vision components,

If you are:	Go to chapter:
Installing I/O	7
Not installing I/O	8

Installing 1771 I/O

Chapter Objectives

This chapter guides you in installing your I/O. It shows you how to:

- set the I/O chassis switches
- set the I/O chassis configuration jumper
- set the I/O adapter module switches
- install keying bands and wiring arms
- install I/O modules
- connect wiring arms
- connect your I/O to the RS module

If you are not installing I/O modules, go to the next chapter.

What You Should Have Completed

Make sure you have mounted and grounded your I/O chassis and power supply as shown in chapters 2 and 3 of this manual.

Before You Begin

Gather the I/O information from the system designer (including the worksheet). This information should contain:

- switch settings for the I/O chassis and modules
- the names of the I/O modules to install and where to install them (chassis, rack)
- the I/O to wire
- identification for each I/O
- the I/O channel connections to make

You may also need the specific publication for each type of I/O module you are installing.

Set I/O Chassis Switches

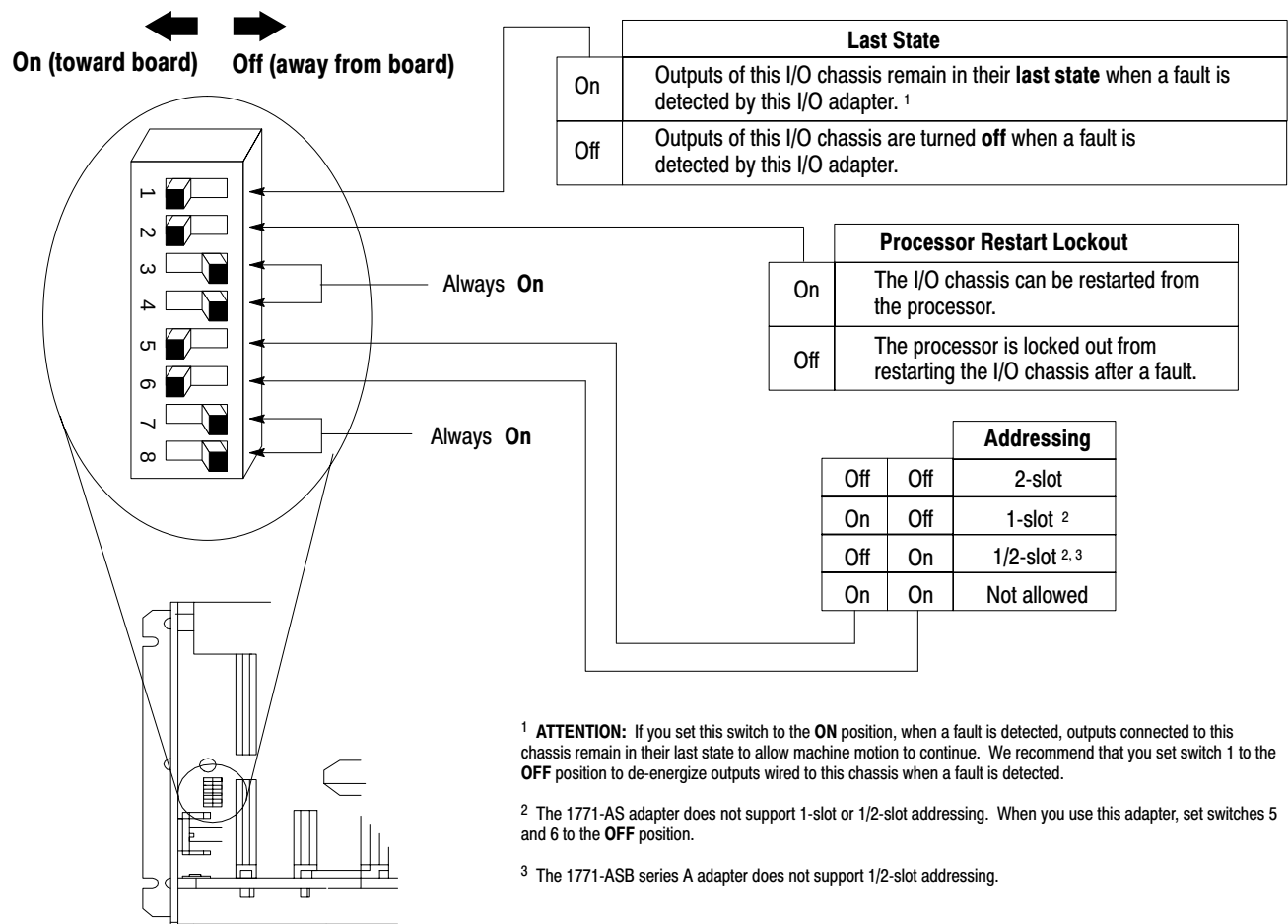
On the 1771-A1B, -A2B, -A3B, -A3B1, -A4B chassis set the backplane switches to determine:

- last state (switch 1)
- processor restart lockout (switch 2)
- type of addressing (switches 5 and 6)

Set these switches before you install the adapter module.

1. Locate the eight switches located on the left side of the chassis backplane.
2. Using the worksheet, set the I/O chassis switch assembly as indicated with a ball-point pen (Figure 7.1). Do not use a pencil because the tip can break off and jam or short the switch.

Figure 7.1
Set Switches on the I/O Chassis

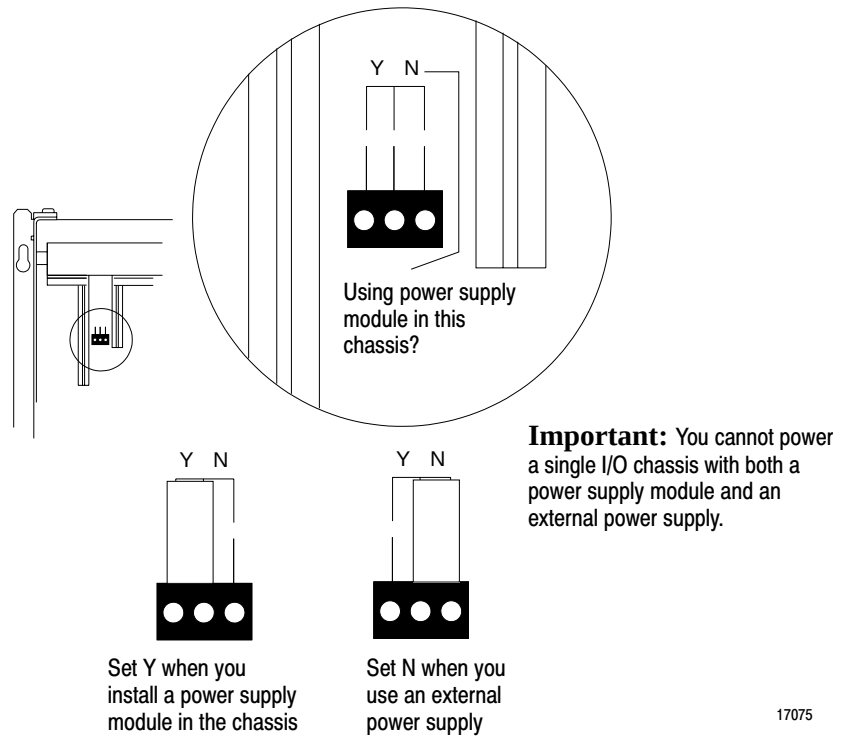


Set the I/O Chassis Configuration Jumper

Set the configuration jumper to indicate which type of power supply the chassis will use.

1. Locate the chassis jumper on the backplane.
2. Set the jumper (Figure 7.2). It is factory set to Y for a power-supply module that you install in the chassis. If you are using a power supply that is not installed inside the chassis, set the jumper to N.

Figure 7.2
Set the Configuration Jumper



17075

Set I/O Adapter Module Switches

On the adapter you install in the 1771-A1B, -A2B, -A3B, -A3B1, -A4B chassis, set the switches as shown in [Figure 7.3](#) or [Figure 7.4](#).

1. Locate switch assembly 1 (SW-1) and switch assembly 2 (SW-2). See [Figure 7.3](#).

Figure 7.3
Switch Settings for 1771-AS, -ASB/A, -ASB/B Adapter

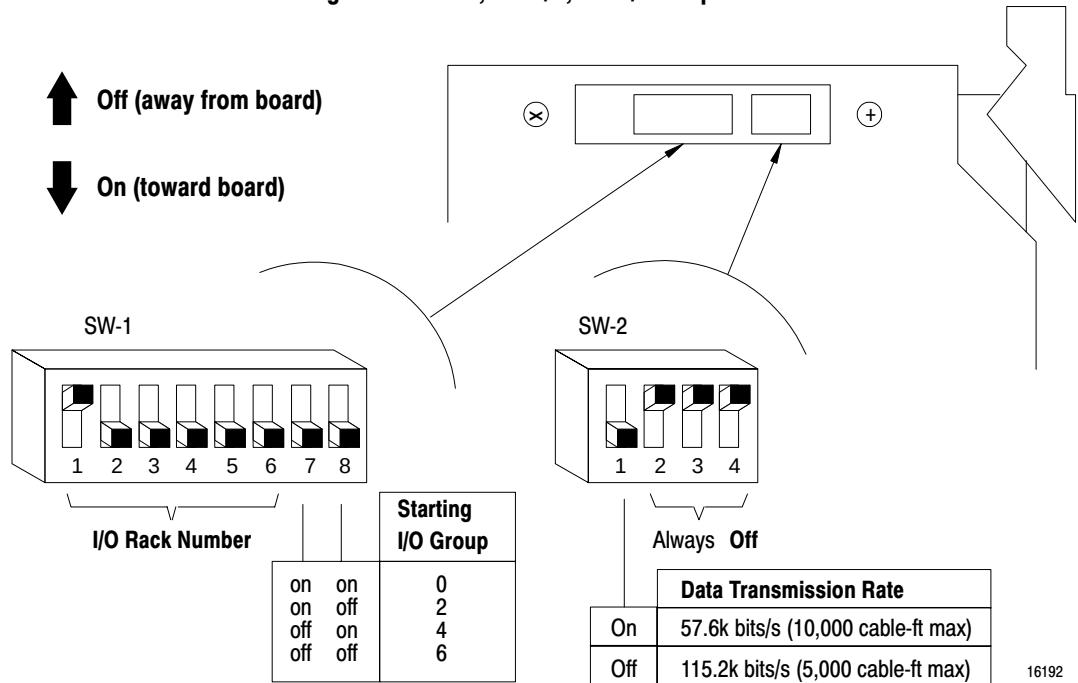
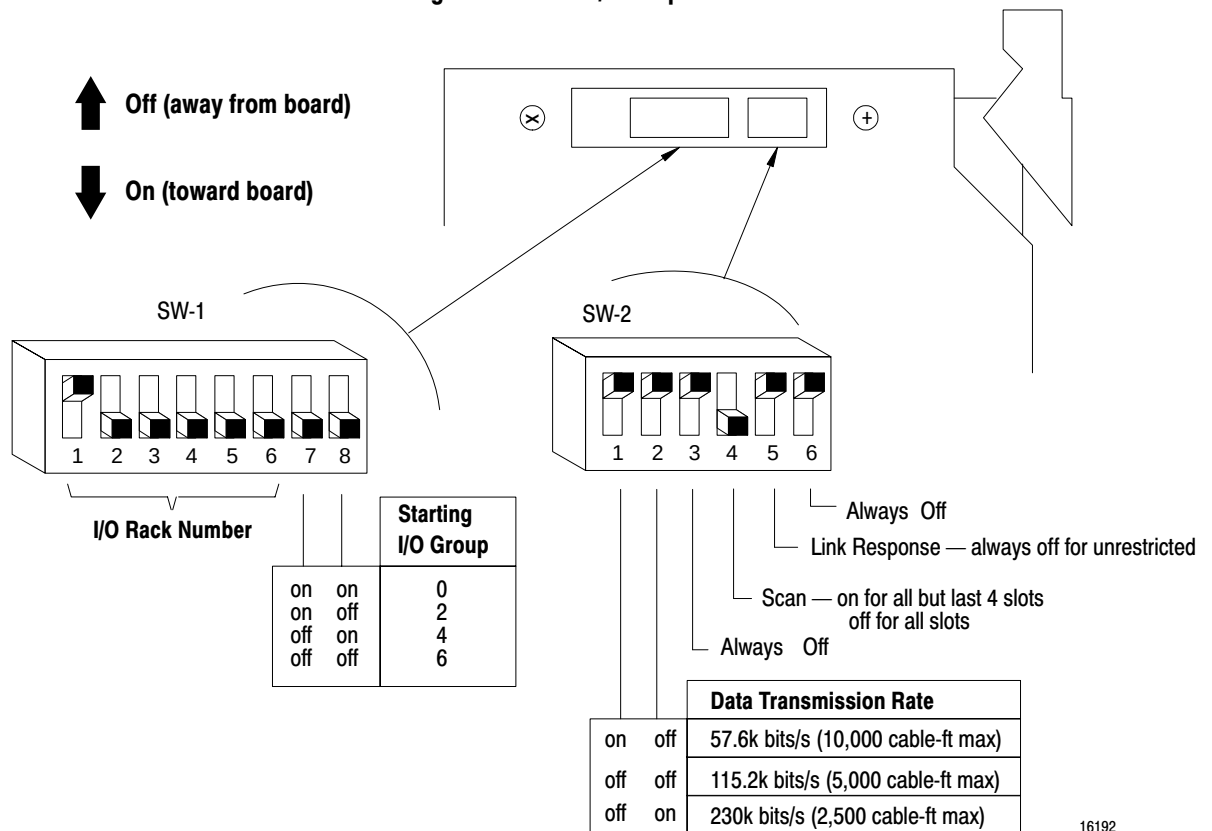


Figure 7.4
Switch Settings for 1771-ASB/C Adapter



2. Set switches 1 through 6 of switch assembly SW-1 to the desired I/O rack number.

I/O rack number, (octal)	Switch					
	1	2	3	4	5	6
0	ON	ON	ON	ON	ON	ON
1	ON	ON	ON	ON	ON	OFF
2	ON	ON	ON	ON	OFF	ON
3	ON	ON	ON	ON	OFF	OFF
4	ON	ON	ON	OFF	ON	ON
5	ON	ON	ON	OFF	ON	OFF
6	ON	ON	ON	OFF	OFF	ON
7	ON	ON	ON	OFF	OFF	OFF
10	ON	ON	OFF	ON	ON	ON
11	ON	ON	OFF	ON	ON	OFF
12	ON	ON	OFF	ON	OFF	ON
13	ON	ON	OFF	ON	OFF	OFF
14	ON	ON	OFF	OFF	ON	ON
15	ON	ON	OFF	OFF	ON	OFF
16	ON	ON	OFF	OFF	OFF	ON
17	ON	ON	OFF	OFF	OFF	OFF
20	ON	OFF	ON	ON	ON	ON
21	ON	OFF	ON	ON	ON	OFF
22	ON	OFF	ON	ON	OFF	ON
23	ON	OFF	ON	ON	OFF	OFF
24	ON	OFF	ON	OFF	ON	ON
25	ON	OFF	ON	OFF	ON	OFF
26	ON	OFF	ON	OFF	OFF	ON
27	ON	OFF	ON	OFF	OFF	OFF
30	ON	OFF	OFF	ON	ON	ON
31	ON	OFF	OFF	ON	ON	OFF
32	ON	OFF	OFF	ON	OFF	ON
33	ON	OFF	OFF	ON	OFF	OFF
34	ON	OFF	OFF	OFF	ON	ON
35	ON	OFF	OFF	OFF	ON	OFF
36	ON	OFF	OFF	OFF	OFF	ON
37	ON	OFF	OFF	OFF	OFF	OFF

3. Set the number of the starting I/O group in the chassis (SW1).

Starting I/O group number:	Switch:	
	7	8
0	on	on
2	on	off
4	off	on
6	off	off

4. Set the data transmission rate on the adapters as shown in [Figure 7.3](#) or [Figure 7.4](#).
5. For 1771-ASB/C, select the scan mode as shown [Figure 7.4](#) (SW2).
 - If you set the switch to **on**, all but the last four slots will be scanned. Do this if you're not using the last four slots in the chassis to minimize scan time.
 - If you set the switch to **off**, all slots will be scanned.
6. For 1771-ASB/C, set link response **off** for unrestricted (SW2).

Configure the Extended-Local I/O Adapter Module

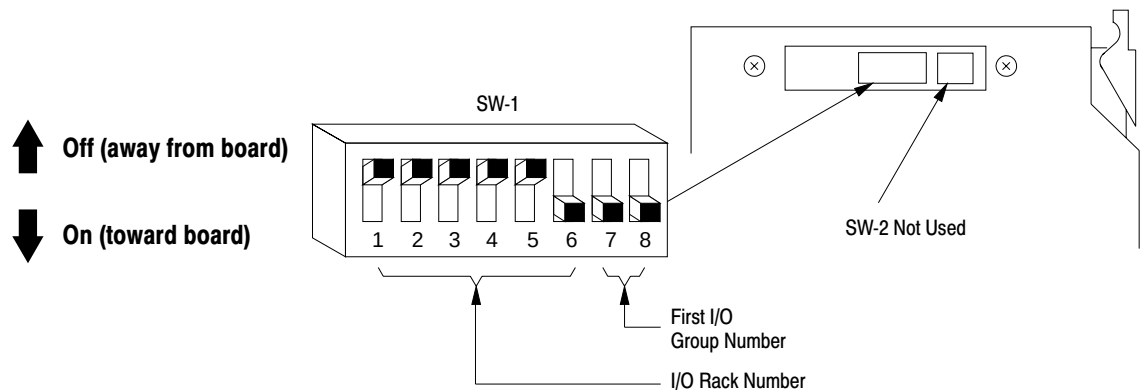
To configure the extended-local I/O adapter module (cat. no. 1771-ALX), you must:

- define the starting I/O rack number and available first I/O group for the extended-local I/O adapter by setting the switches on switch assembly SW1
- specify the types of I/O modules being used in the extended-local I/O racks by setting the configuration plug

Set Switch Assembly 1

To set switch assembly SW1, do the following:

1. Locate switch assembly SW1 on the extended-local I/O adapter module.



2. Set switches to define the I/O rack address. Use [Table 7.A](#)

Table 7.A
Switch Settings for Available Starting Extended-local I/O rack Numbers

To select rack:	Set switch:						To select rack:	Set switch:					
	1	2	3	4	5	6		1	2	3	4	5	6
00	on	on	on	on	on	on	40	off	on	on	on	on	on
01	on	on	on	on	on	off	41	off	on	on	on	on	off
02	on	on	on	on	off	on	42	off	on	on	on	off	on
03	on	on	on	on	off	off	43	off	on	on	on	off	off
04	on	on	on	off	on	on	44	off	on	on	off	on	on
05	on	on	on	off	on	off	45	off	on	on	off	on	off
06	on	on	on	off	off	on	46	off	on	on	off	off	on
07	on	on	on	off	off	off	47	off	on	on	off	off	off
10	on	on	off	on	on	on	50	off	on	off	on	on	on
11	on	on	off	on	on	off	51	off	on	off	on	on	off
12	on	on	off	on	off	on	52	off	on	off	on	off	on
13	on	on	off	on	off	off	53	off	on	off	on	off	off
14	on	on	off	off	on	on	54	off	on	off	off	on	on
15	on	on	off	off	on	off	55	off	on	off	off	on	off
16	on	on	off	off	off	on	56	off	on	off	off	off	on
17	on	on	off	off	off	off	57	off	on	off	off	off	off
20	on	off	on	on	on	on	60	off	off	on	on	on	on
21	on	off	on	on	on	off	61	off	off	on	on	on	off
22	on	off	on	on	off	on	62	off	off	on	on	off	on
23	on	off	on	on	off	off	63	off	off	on	on	off	off
24	on	off	on	off	on	on	64	off	off	on	off	on	on
25	on	off	on	off	on	off	65	off	off	on	off	on	off
26	on	off	on	off	off	on	66	off	off	on	off	off	on
27	on	off	on	off	off	off	67	off	off	on	off	off	off
30	on	off	off	on	on	on	70	off	off	off	on	on	on
31	on	off	off	on	on	off	71	off	off	off	on	on	off
32	on	off	off	on	off	off	72	off	off	off	on	off	on
33	on	off	off	on	off	off	73	off	off	off	on	off	off
34	on	off	off	off	on	on	74	off	off	off	off	on	on
35	on	off	off	off	on	off	75	off	off	off	off	on	off
36	on	off	off	off	off	on	76	off	off	off	off	off	on
37	on	off	off	off	off	off	77	off	off	off	off	off	off

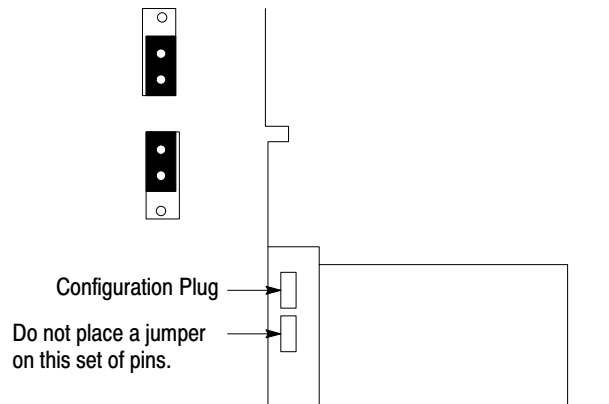
- Set switches to define the first I/O group number. Use Table 7.B

Table 7.B
Extended-Local I/O Adapter Switch Settings, First I/O Group Number

For First I/O Group Number:	Set switch:	
	7	8
0	on	on
2	on	off
4	off	on
6	off	off

Set the Configuration Plug

Use the configuration plug to specify whether you want to use 32-point modules or 1771-IX and -IY modules in the chassis with the extended-local I/O adapter module. If you are not using either one, the plug may be left in either position.



- Lay the module on its right side.

The configuration plugs are visible on the lower rear of the module.
- Set the configuration plug as shown below according to your application.

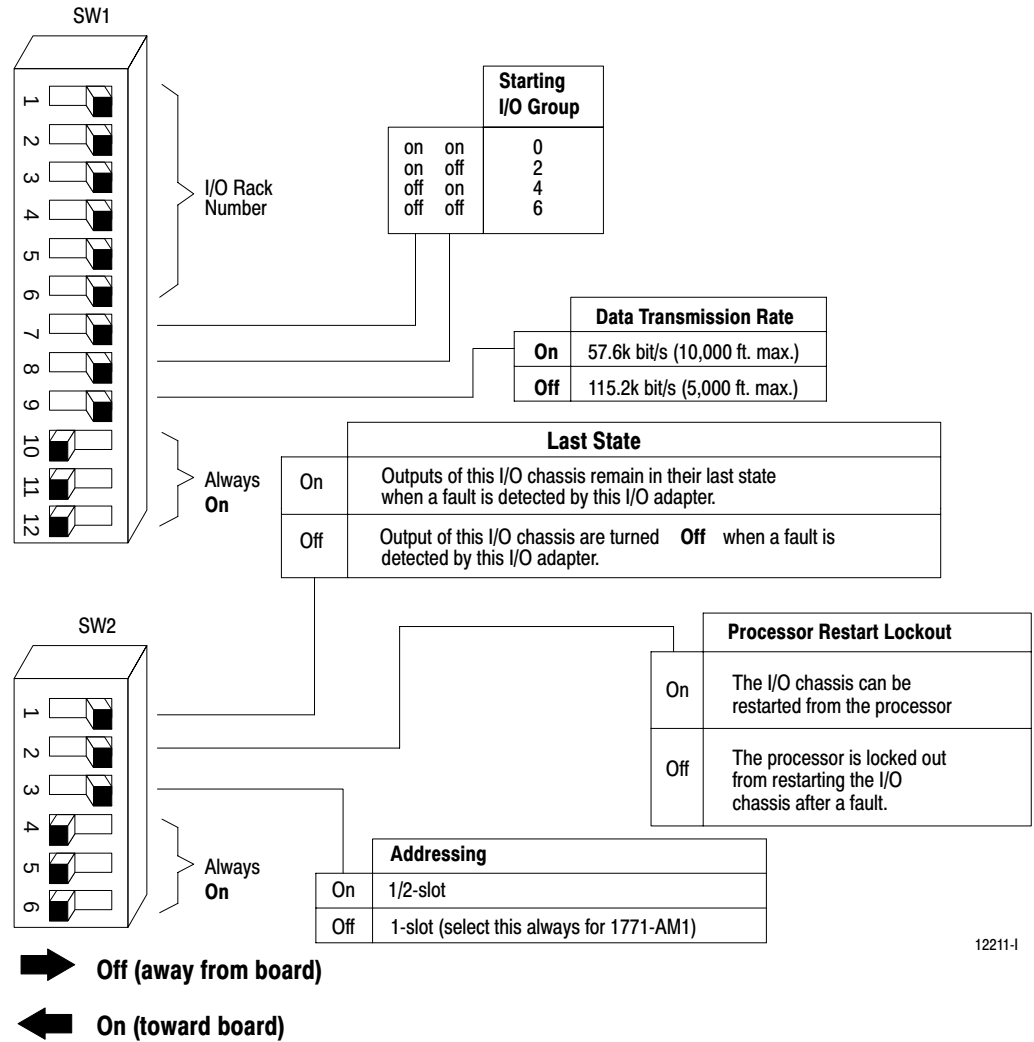
17341

If you are using:	But not:	Set configuration plug:
32-point I/O modules and any address method	1771-IX or 1771-IY	on the 2 lower pins
1771-IX and 1771-IY modules and any addressing method	32-point I/O modules	on the 2 upper pins

Set 1771-AM1, -AM2 I/O Chassis/Adapter Switches

On the 1771-AM1, -AM2 I/O chassis with integral power supply and adapter set the switches as shown in Figure 7.5.

Figure 7.5
Switch Settings on the I/O Chassis with Integral Power Supply and Adapter (1771-AM1,-AM2)



12211-I

Install Keying Bands

To install keying bands, you need the:

- installation documentation for the specific 1771 I/O module you are using
- I/O documentation from the system designer (including Worksheet 3.9) that indicates the position of each module

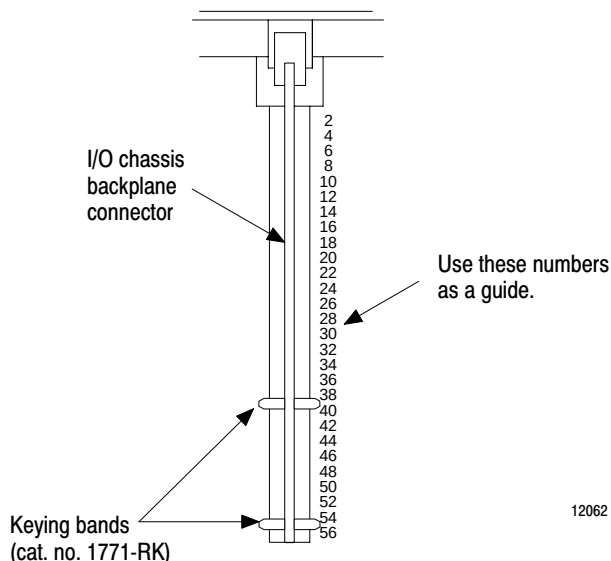


ATTENTION: A module inserted into a wrong slot could be damaged by improper voltages connected through the wiring arm. Use keying bands to help prevent damage to the module.

Follow the steps below to key the I/O modules:

1. Locate the module's location (chassis and rack) in the I/O information from your system designer.
2. Locate the keying information in the installation data sheet of the I/O module you are installing.
3. Using long nose pliers, insert keys for each I/O module into the backplane sockets of the I/O chassis at the module's location.
4. Position the keys between the numbers at the right of the connectors as indicated in the module's documentation (Figure 7.6).

Figure 7.6
Install Keying Bands



12062

Installing and Wiring I/O Modules

Install the I/O modules, including wiring between wiring arms and various input and output devices. If you follow this procedure carefully, you can minimize wiring errors. You must place each I/O module correctly, and make every I/O connection at the proper wiring-arm terminal. Color-coded labels identify the various types of I/O modules. Also, other labels allow you to write in the address of each I/O terminal.

Insulation color is useful for identifying various groupings of wires. For example, the Bulletin 1790 Assembled Systems, optionally available from A-B Quality and Productivity Systems Division, typically have red ac wires and blue dc wires. However, follow all local electrical codes.

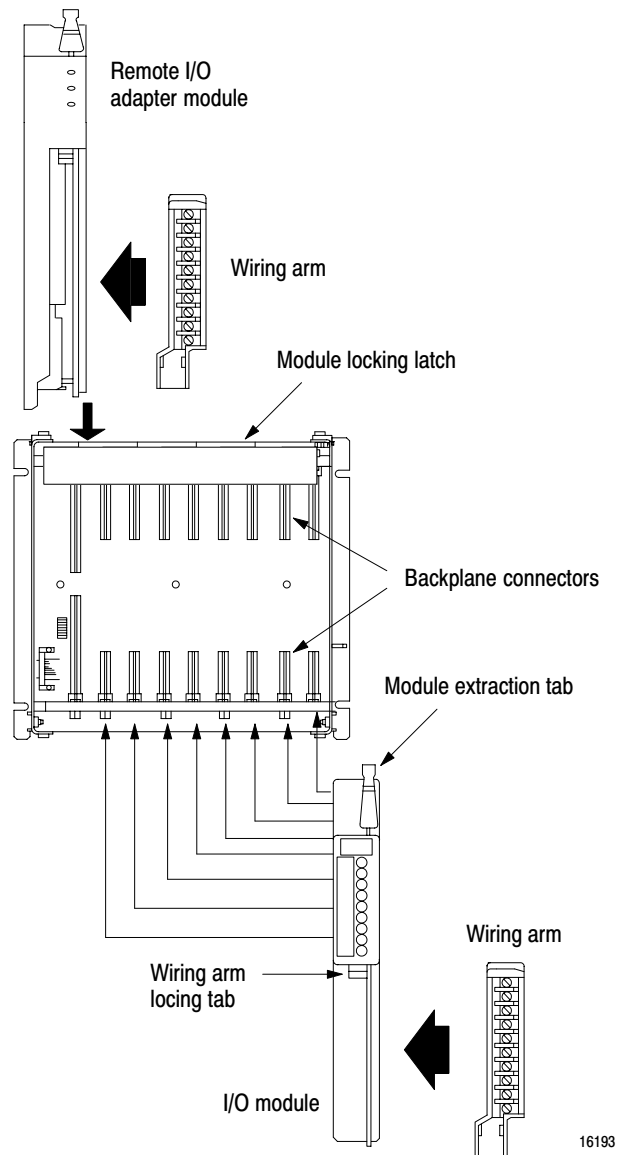
Several I/O modules require shielded-cable connections. We give you shielded-cable-connection instructions (page 7-17), which supplement the general instructions in this section.

This installation procedure is necessarily general in nature. Many types of I/O modules are available, and the connections vary according to module type. The specific wiring required for each type of I/O module is in the separate installation data publication for that specific module type. Therefore, see [Figure 7.7](#) and the appropriate installation data publication during execution of the following steps.



ATTENTION: Do not force a module into a backplane connector; if you cannot seat a module with firm pressure, check the alignment and keying. Forcing a module can damage the backplane connector or the module.

Figure 7.7 1771-I/O Hardware Components



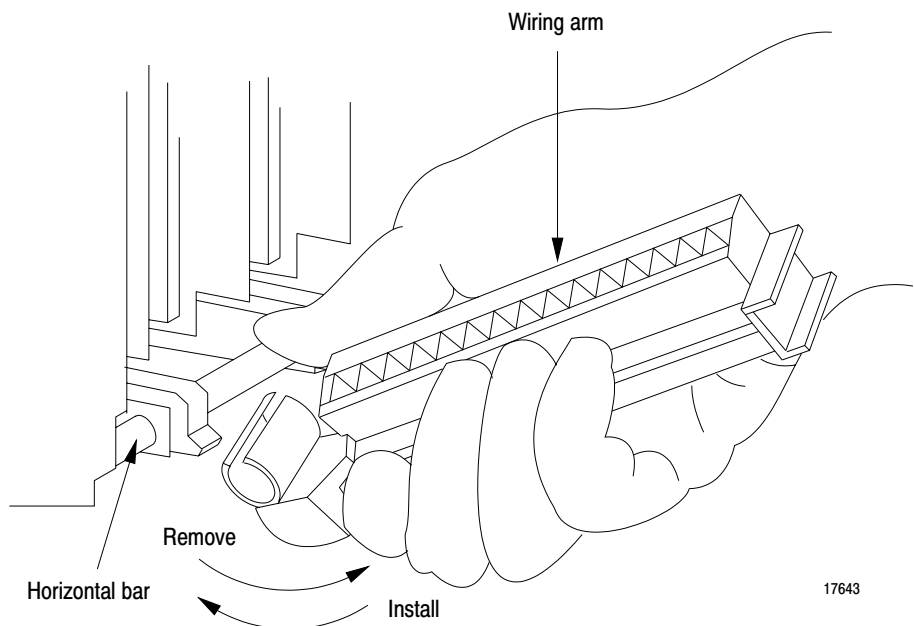
Install Modules

Open locking latch and insert each I/O module into the slot keyed for it. Firmly press to seat each module into its backplane connector. After you install all the modules, secure them with the module locking latch.

Install Wiring Arms

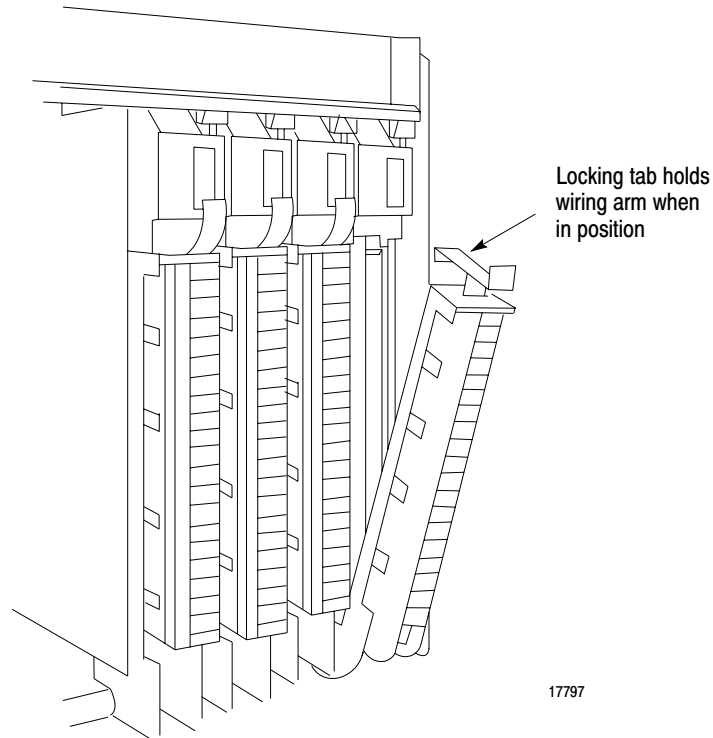
See the corresponding product data publication for the proper wiring arm for each module. Snap each wiring arm onto the horizontal bar at the lower front edge of the I/O chassis as shown in Figure 7.8. Typically, it is necessary to start one corner of the C-shaped bracket over the horizontal bar first, then slip the remainder over the bar with a twisting motion.

Figure 7.8
Snapping Wiring Arm into Chassis



Swing each arm up to connect on the front edge of its module as shown in [Figure 7.9](#). Push each arm in until it is held in place by its locking tab.

Figure 7.9
Wiring Arms Installed



Connect I/O Lines

Use a flat-head screwdriver to remove the terminal cover from each wiring arm to expose the terminals (if a terminal requires shielded-cable connection, see page 7-17). Connect the wires between the I/O devices and the wiring arm terminals.

- Trim the length of the wire to approximately 3/4 of an inch above its terminal.
- Strip approximately 3/8 of an inch insulation from the end of the wire.
- Bend the end of the wire to the right, and place the bare copper wire under the pressure plate of the terminal screw (optionally, you can use a spade lug).
- Tighten the screw, and check that the wire is firmly in place.

Test Connections

Determine that each I/O line is correctly connected between its I/O terminal and its input or output device. Test for continuity. A simple continuity test may be accomplished by temporarily jumping an I/O terminal to ground; then checking for very low resistance to ground at the other end of the I/O wire where it connects to its input or output device. This test does not check for I/O components being shorted together or to ground. Provide wire-number labels at all wire connections, including those at any optional user-supplied terminal strips. Use the logical I/O addresses (link/chassis/module-slot/terminal) as wire numbers.

Connect Power Lines



ATTENTION: Do **not** turn on power to any input or output circuit at this time. To avoid exposing personnel to electric shock hazards, all input and output devices must remain de-energized until power is required during the check-out procedure.

Connect the various user-supplied power and “common” (ground) wires. Distribute these wires among the wiring arms in such a way that no single wire exceeds its rated current.



ATTENTION: Calculate the maximum possible current in each power and common wire. Do not exceed the rated current for any particular wire size permitted by the local electrical code. Overheated wires and damaged insulation may result from over-loading.

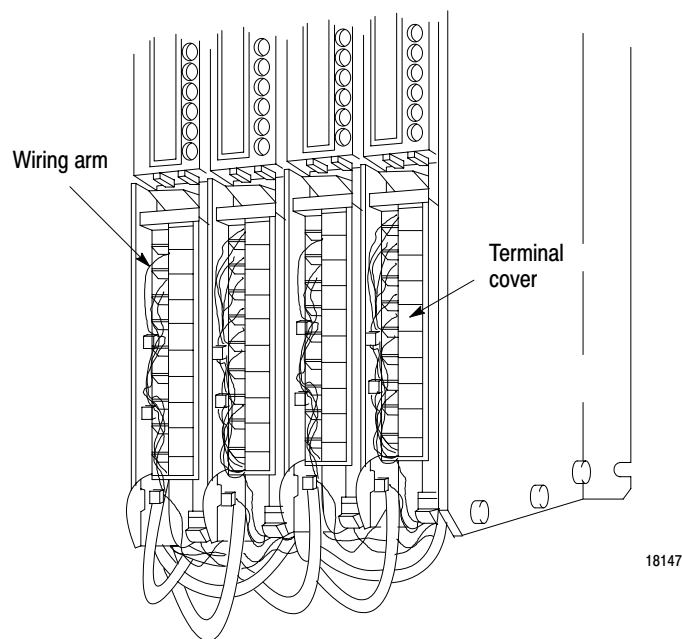
Tie Wrap

Use tie wraps to gather the wires at each wiring arm. Neatly bundle wires in a way that will allow the arms to pivot from vertical to horizontal.

Replace Covers

Snap the terminal covers back onto the wiring arms (Figure 7.10). There is a blank label on each terminal cover and beside the terminal status indicators on each I/O module. Write terminal designation information on these labels; it will be useful during system start-up and troubleshooting.

Figure 7.10
Terminal Covers in Place Over Wiring Arms



Connecting Shielded Cables

Some I/O modules require shielded-cable connections to help reduce the effects of electrical noise coupling. Unless specified otherwise, the recommended cable is Belden 8761. The individual installation data sheet for each module specifies which connections require shielded-cable and gives exact wiring connections. In general, however, cable installation practices must follow these outlined here.

Avoid breaking shields at junction boxes. Many types of connectors for shielded conductors are available from various manufacturers. If you do break a shield at a junction box:

- connect only category-2 conductors in the junction box
- do not strip the shield back any further than necessary to make a connection
- connect the shields of the two cable segments to ensure continuity along the entire length of the cable

Unless otherwise specified, connect each cable shield to earth ground at the I/O-chassis end as we describe here. Always connect the shield to ground at one end of the cable only (never ground any cable shield at both ends). A shield grounded at both ends forms a ground loop which could cause faulty operation.

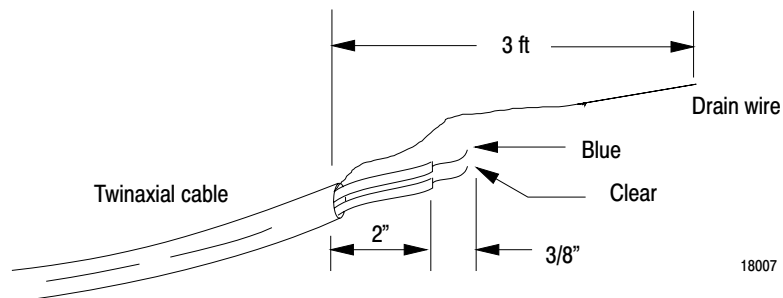
Ground each shield at the end specified in the appropriate publication for the product. Never connect a shield to the common side of a logic circuit (this would introduce noise into the logic circuit). Connect each shield directly to a chassis ground.

Since each I/O chassis must be connected to earth ground, any connection to a properly mounted I/O chassis is also a connection to ground.

To properly connect a shielded cable at a wiring arm and connect the shield to ground at the I/O chassis, execute the following procedure:

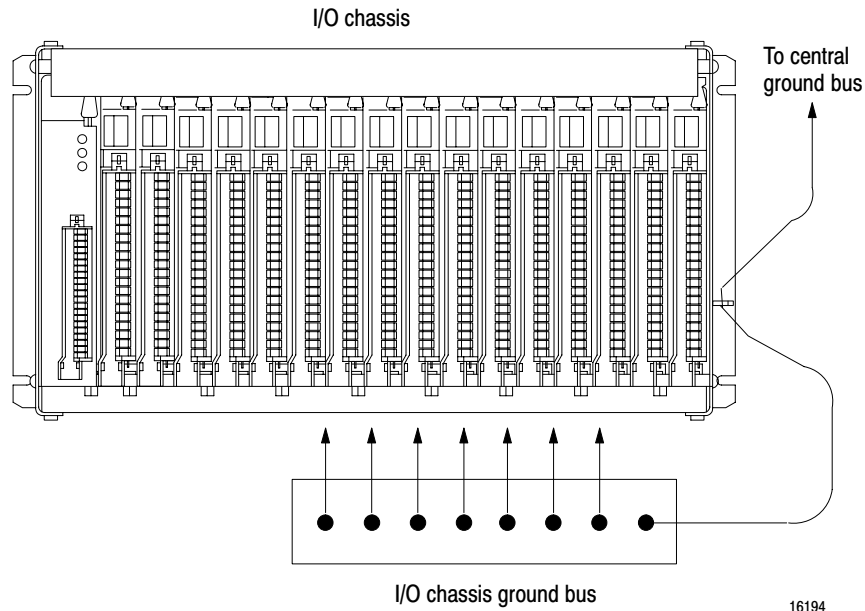
1. At the cable end which is to connect to the wiring arm, strip off 3 ft of the outer jacket to expose the foil.
2. Strip off the exposed foil. It may be necessary to insulate the bare drain wire with tape or shrink- tubing along areas where it might otherwise come into contact with wiring arm terminals.
3. Trim both insulated wires to 2-inch lengths. Then strip approximately 3/8-inch of insulation from the end of each wire. The shield strand (drain wire) is left at its full 3-ft length (Figure 7.11).

Figure 7.11
Shielded Wire Stripped and Ready for Installation



4. Connect the insulated wires at the wiring arm terminals specified in the I/O module product data publication. Fold back the bare drain wire as you route the cable. The insulated wires connect to the user device at the other end of the cable.
5. Connect the bare drain wire to ground. Route it from the wiring arm to the I/O chassis stud or an I/O chassis ground bus. A lug can be used. In applications where many shielded cables are connected at a single I/O chassis it may be necessary to mount a ground bus directly below the I/O chassis for a ground connection for these drain wires as in [Figure 7.12](#).

Figure 7.12
An I/O Chassis Ground Bus Providing Ground Connection for Several Drain Wires



Connecting I/O Power Supplies

Install each power supply for each I/O chassis as described in the installation data sheet shipped with each power supply.



ATTENTION: If you use separate ac power sources for the power supply and all input devices connected to the I/O chassis, and if power is lost at the input devices while the power supply continues to operate, incorrect input data could be stored in memory.

What to do Next

If you are:	Go to chapter:
installing non-standard I/O	8
connecting the I/O link	9

Installing Non-standard I/O

Chapter Objectives

This chapter describes how to install non-standard I/O, in particular, how to make hardware selections to specify the I/O addressing. To install this non-standard I/O, follow the general procedures described in this chapter and the publication for the specific adapter. This chapter covers:

- setting Direct Communication Module switches
- setting PLC interface module switches
- setting 1785 PLC-5 processor switches
- setting RediPANEL switches

Conventions

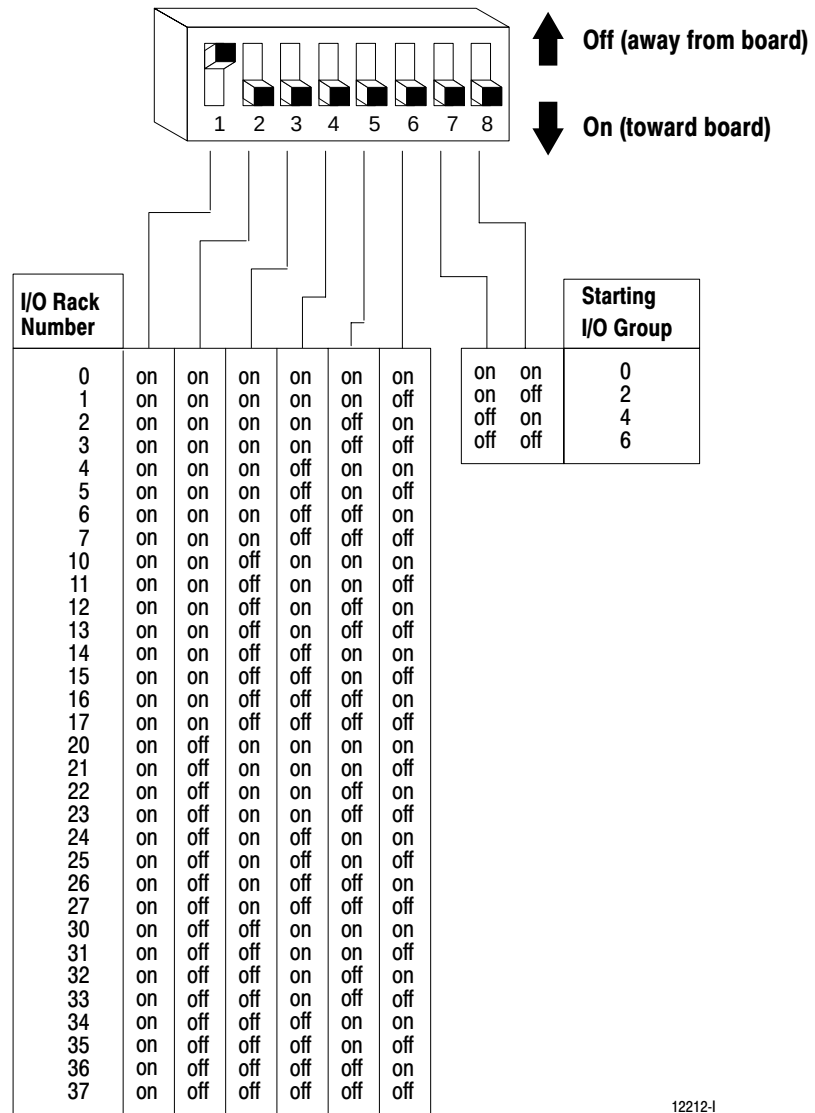
In this chapter, we show and describe switches as being **on** or **off**. Printed on the actual switch assemblies are the words ON and OFF or the word OPEN. OPEN corresponds to OFF. In some cases, the switch has a toggling lever that you push down toward the board or lift up away from the board. In those cases, we may describe the switches as being **up** or **down**.

An I/O chassis contains an I/O adapter and I/O modules. In a broader sense, we sometimes use the term I/O chassis to include hardware such as Bulletin 2705 RediPANEL modules with built-in I/O interfaces. We do this because the built-in I/O interface communicates with the I/O scanner over the I/O link in the same way that an I/O adapter in an I/O chassis (in the narrow sense) does.

Setting Direct Communication Module Switches

To install a direct communication module (cat. no. 1771-DCM), set the switches of switch-bank 0 as described in publication 1771-6.5.27. Set the switches of switch-bank 1 as described here. Set switches 1 through 6 to select the I/O rack number and set switches 7 and 8 to select the starting I/O group as shown in [Figure 8.1](#).

Figure 8.1
Direct Communication Module Switches

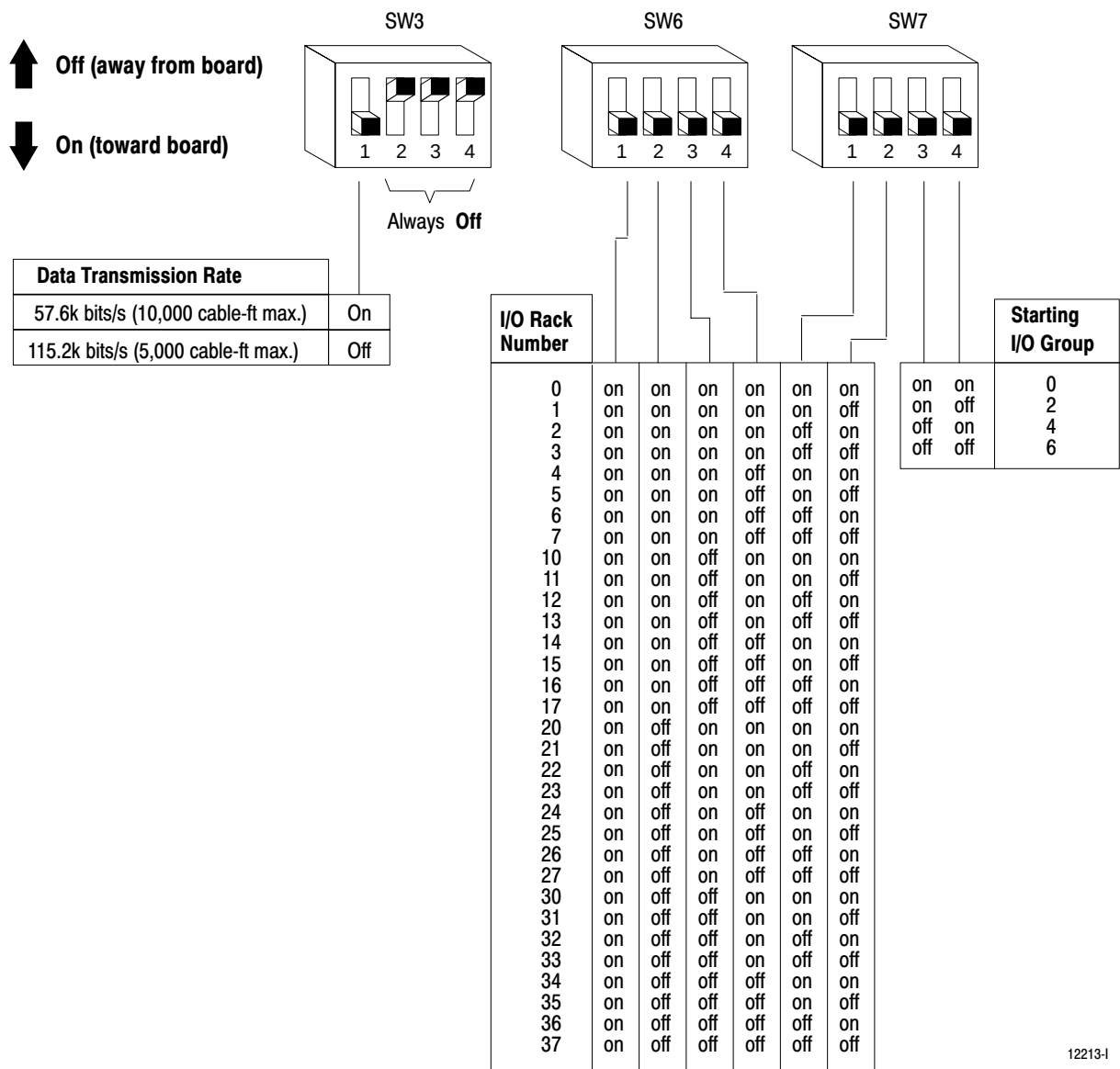


12212-I

Setting PLC Interface
Module Switches

To install a PLC interface module (3500-NA1), set the switches as described here; set the jumpers as described in publication 1352-5.0.2. Switch assemblies SW3, SW6, and SW7 are located across the bottom of the module (Figure 8.2).

Figure 8.2
Setting PLC Interface Module Switches



12213-1

Setting 1785 PLC-5 Processor Switches

To install a 1785 PLC-5 processor in adapter mode, set the switches in switch assembly SW2 as described here; set all other switches, including the I/O chassis backplane switches as described in the *1785 PLC-5 Installation Manual* (1785-6.6.1).

Use switch assembly SW2 to set the I/O rack number and the number of words to communicate. These switches are accessible from the bottom of the module. Always set switch 1 to up ([Figure 8.3](#)).

Number of Words

Switch 2 determines the number of 16-bit words the scanner will write to the PLC-5 processor and the number of words read from the PLC-5 processor. Set switch 2 as follows:

If switch 2 is set as:	Then the scanner writes and reads:
down	four words to and from the PLC-5 processor.
up	eight words to and from the PLC-5 processor.

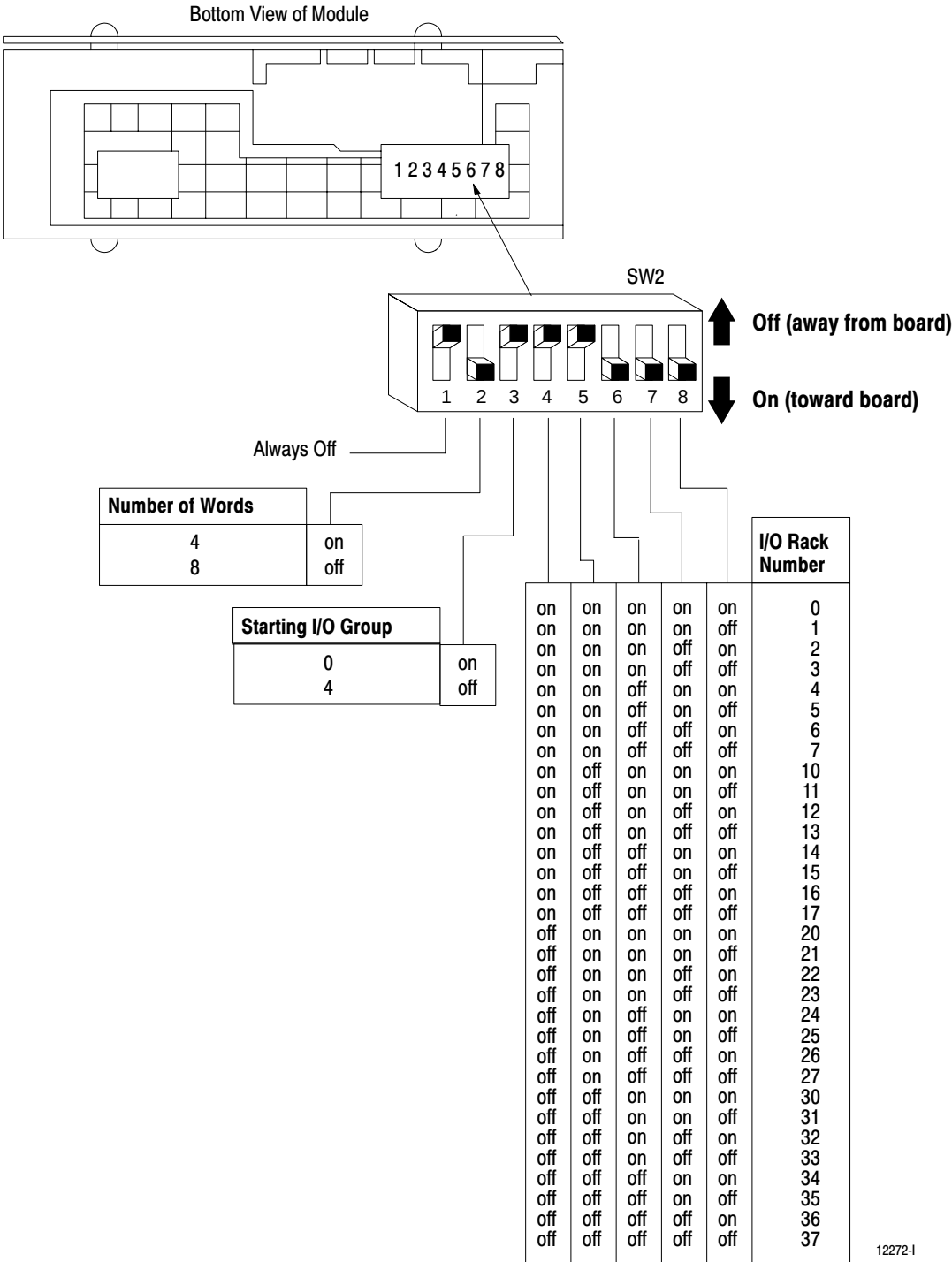
I/O Rack Number

When a 1785 PLC-5 processor is used as an I/O adapter for the PLC-5/250 RS, it must be assigned an I/O rack number through which it is addressed from the scanner. Switches 4 through 8 determine the I/O rack number through which the 1785 PLC-5 controller is addressed by the scanner.

Starting I/O Number

Switch 3 determines the starting I/O group number. If the number of words is 8, the starting I/O group must be number 0.

Figure 8.3
PLC-5/12, -5/15, -5/25 Processor Module Switches

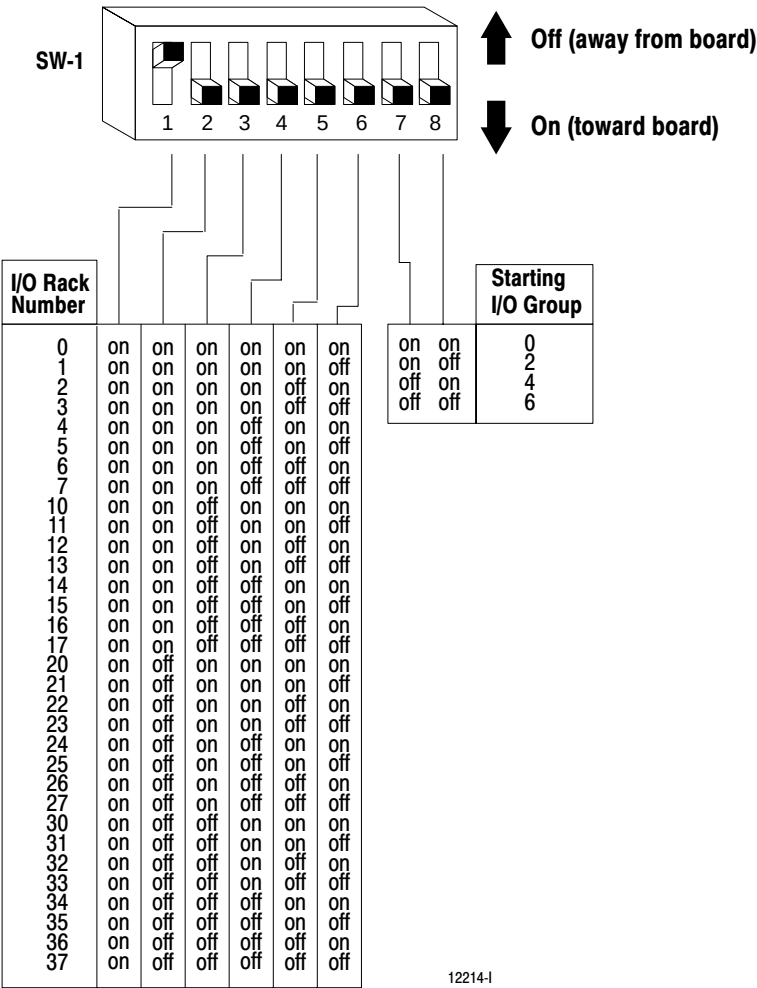


12272-1

Setting RediPANEL
Push-button Module Switches

To install a 2705 RediPANEL push-button module, set the switches of switch assembly SW2 as described in publication 2705-800. Set the switches of switch assembly SW1 as shown in Figure 8.4.

Figure 8.4
Setting RediPANEL Module Switches



Setting RediPANEL Keypad
Module Switches

To install a 2705 RediPANEL keypad module, set the switches of switch assemblies SW2 and SW3 as described in publication 2705-801. Set the switches of switch assembly SW1 as shown in Figure 8.4.

What to do Next

After you finish installing all of your I/O modules, proceed to chapter 9 to connect the I/O link cabling.

Connecting the I/O Link

Chapter Objectives

This chapter describes how to connect an I/O chassis to the RS.

Connecting the Remote I/O Link

The Medium

In an I/O link, the RS and the I/O adapters communicate with one another through 1770-CD twinaxial cable which provides a physical bus medium. You can use the twinaxial cable to form the bus connection between them in either a daisy-chain or a trunkline/dropline configuration. This chapter describes how to connect a daisy-chain configuration. See publication 1770-6.2.1 for information on how to construct a trunkline/dropline configuration.

For each I/O link of the scanner module, you can individually select to have a data-transmission rate of 57.6k bit/s, 115.2k bit/s, or 230k bit/s. At each I/O adapter, you must select the same rate as you select for the link at the RS.

A higher transmission rate provides a faster I/O update. However, the higher the rate of transmission, the shorter the maximum cable length.

If the data transmission rate is:	Then the maximum cable length is:
57.6k bit/s	10,000 ft.
115.2k bit/s	5,000 ft.
230.4k bit/s	2,500 ft.

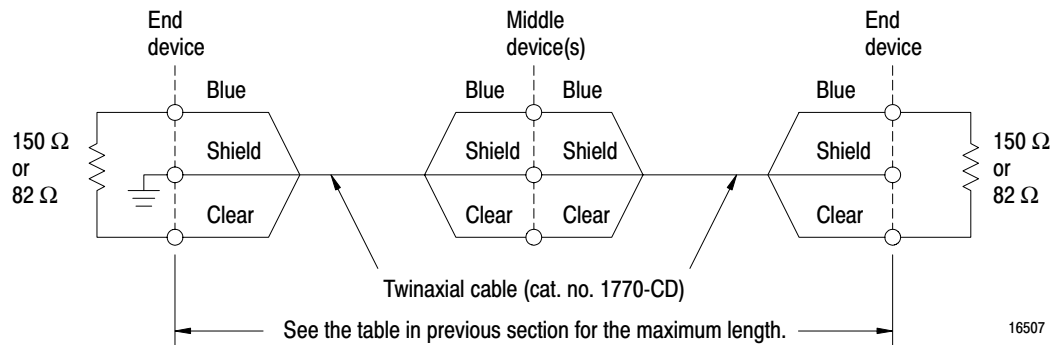
Cabling Configuration

A general cabling configuration is shown in [Figure 9.1](#). The cable has a signal conductor with blue insulation, a signal conductor with clear insulation, and a bare shield drain wire. Observe the color code convention used in the following figures to provide the proper signal polarity. At each end device, connect a termination resistor.

For a transmission rate of:	Connect an:
57.6k bit/s	150-Ohm termination resistor
115.2k bit/s	150-Ohm termination resistor
230.4k bit/s	82-Ohm termination resistor

For RS, always ground one and only one end of the shield.

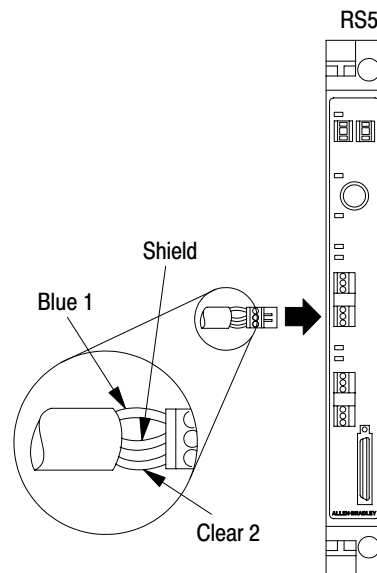
Figure 9.1
General Cabling Configuration



Connecting Remote I/O to the RS

Follow the steps below to connect your remote I/O link cable to the RS.

1. Locate the I/O channel connection on the I/O wiring information.
2. Wire the I/O channel as shown in the wiring documentation.



- a. Remove the male connectors for ports labeled CH 1, CH 2, CH3¹ and CH4¹.
- b. Wire these connectors using Twinaxial Cable (cat. no. 1770-CD).
- c. According to the I/O documentation from your system designer, attach wired connectors to the appropriate female connectors.
- d. Connect the other end of the cable to the remote I/O adapter module or processor module in the remote system.
- e. If there is a 1771-AS, -ASB module at the end of the remote I/O link, connect a terminator (cat. no. 1770-XT) between the terminals on the adapter module.

¹ This applies to RS5 only.

Connecting to 1771-ASB Adapter

Figure 9.2 shows the terminal identification label which indicates the proper connections for each 1771-ASB I/O adapter module in an I/O link. This label is on the side of the module. Make the connections at the screw terminals on the wiring arm on the front of each I/O adapter module.

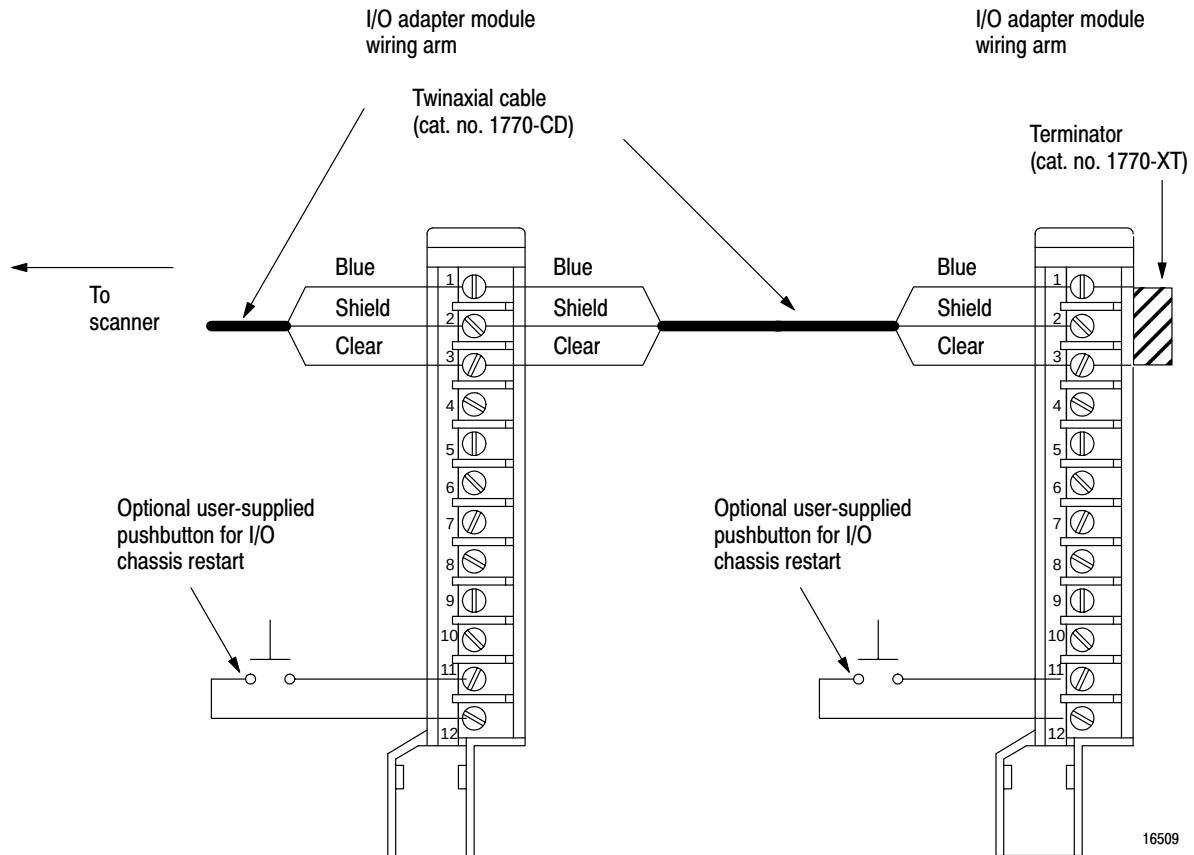
Figure 9.2
I/O Adapter Module Terminal Identification Label

Terminal Identification Cat. No. 1771-ASB	
1	Line 1
2	Shield
3	Line 2
Cable	
4	No connection
5	No connection
6	No connection
7	No connection
8	No connection
9	No connection
10	No connection
11	IN
12	RET
Reset	

10910

Figure 9.3 shows an I/O link connections to a 1771-ASB adapter both as a middle device and as an end device on a link. The blue-insulation conductor corresponds to line 1. The clear-insulation conductor corresponds to line 2. At each adapter, connect the shield drain wire of each cable segment to give the shield continuity. However, never ground the shield at an adapter. At an adapter connected as an end device on a link, connect a terminator (cat. no. 1770-XT) between the terminals.

Figure 9.3
Connections to 1771-ASB Adapter



You can optionally connect a normally-open momentary-contact switch between terminals 11 and 12 at each adapter. Such a reset switch would be particularly useful if processor-restart lockout is selected. If a fault is detected at the I/O chassis, you can use the reset switch to reset the adapter in an attempt to restart the I/O chassis.

Connecting the Extended-Local I/O Link on the RS5 Modules

To connect the extended-local I/O link:

- make sure you have the correct cable length
- make the extended-local I/O connection

Make Sure you have the Correct Cable Length

Use the extended-local I/O cables. These cables have a single-end connector on one end and a dual-end connector on the other. The maximum cable length for an extended-local I/O system is 30.5 cable-m (100 cable-ft). Connect extended-local I/O adapters using any of these cables (Table 9.A):

Table 9.A
Standard Extended-Local I/O Cables

Cable Length:	Catalog Number:
1 m (3.3 ft)	1771-CX1
2 m (6.6 ft)	1771-CX2
5 m (16.5 ft)	1771-CX5
0.15 m (0.5 ft)	5110-MXC4

Important: You cannot connect or splice extended-local I/O cables to form a custom cable length. For example, if you have a distance of four meters between two extended-local I/O adapters or between a processor and an extended-local I/O adapter, you cannot connect two 2 m cables together. You would have to use the 5 m cable and have the extra meter as slack.

If you do need a custom cable, these are available (Table 9.B):

Table 9.B
Custom Extended-Local I/O Cables

Cable Length:	Catalog Number:
7 m (23 ft)	1771-CX7
10 m (32.9 ft)	1771-CX10
15 m (49.3 ft)	1771-CX15
20 m (65.7 ft)	1771-CX20
25 m (82.1 ft)	1771-CX25
30 m (98.6 ft)	1771-CX30

Make Extended-Local I/O Connections

Important: Follow these considerations when making extended-local I/O connections:

- do not apply power to an I/O rack containing an extended-local I/O adapter module until all extended-local I/O cables are installed and connected
- make extended-local I/O connections according to Figure 9.4

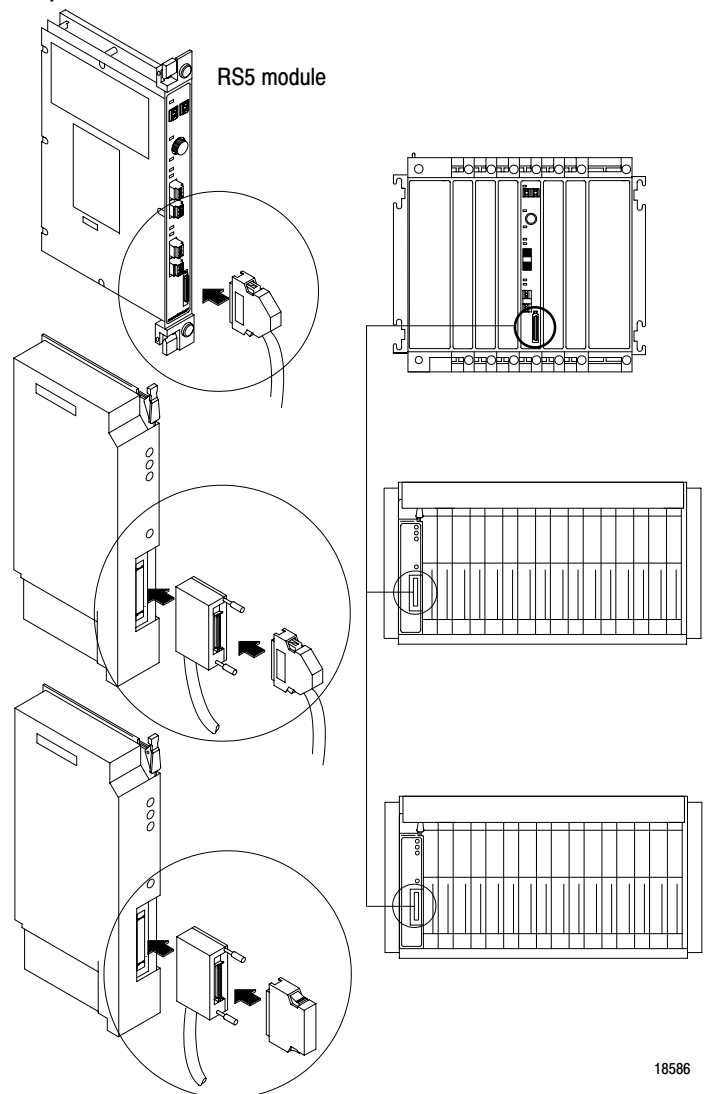


ATTENTION: Turn off power to the extended-local I/O adapter module before connecting or disconnecting extended-local I/O cables to prevent the possibility of corrupting the data.

Figure 9.4
Make Extended-Local I/O Connections

- Connect the single-end connector to channel 5 of the RS5.
- Route the cable to the first local I/O and adapter.
- Connect the dual-end connector to the local I/O adapter module. Be sure to screw-in the retaining screws tightly.
-

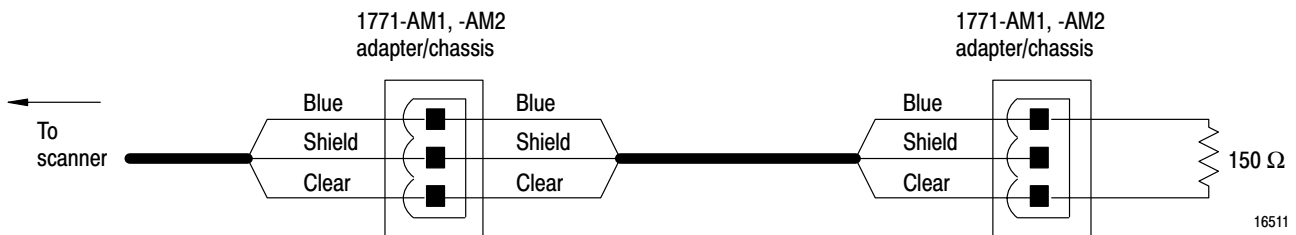
If the adapter:	Then:
is not the last one on the link	- Connect the single-end of a local I/O network cable to the exposed end connector on the adapter module. Press and hold the clips and snap to the mating connector. - Route the cable to the next adapter and connect the dual-end connector to it.
is the last one on the link	Terminate the link by installing the local I/O terminator (1771-CXT) to the exposed end of the dual-end connector on the last adapter module. The system will not run without it. The terminator is included with the processor.



Connecting to a 1771-AM1, -AM2 I/O Chassis with Integral Power Supply and Adapter

Figure 9.5 shows I/O link connections to a 1771-AM1, -AM2 chassis both as a middle device and as an end device on a link. The blue-insulation conductor connects to the top terminal. The clear-insulation conductor connects to the bottom terminal. At each 1771-AM1, -AM2, connect the shield drain wire of each cable segment to give the shield continuity. However, never ground the shield at a 1771-AM1, -AM2. At a 1771-AM1, -AM2 connected as an end device on a link, connect a 150-Ohm 1/4-Watt termination resistor across the signal lines.

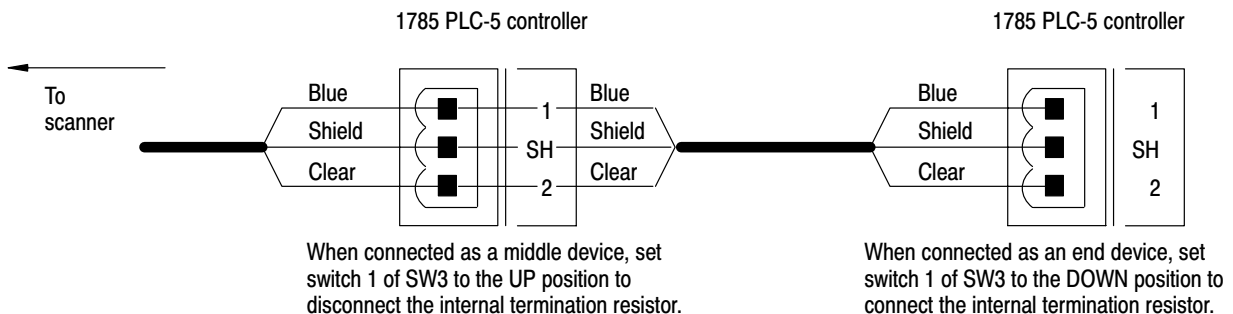
Figure 9.5
Connections to a 1771-AM1, -AM2 Adapter/Chassis



Connecting to a 1785 PLC-5 Controller

Figure 9.6 shows I/O link connections to a 1785 PLC-5 controller both as a middle device and as an end device on a link. Connection is to the remote I/O terminals. The blue-insulation conductor connects to the line-1 terminal. The clear-insulation conductor connects to the line 2 terminal. At each 1785 PLC-5 controller, connect the shield drain wire of each cable segment to give the shield continuity. However, never ground the shield at a PLC-5 controller. At a 1785 PLC-5 controller connected as a middle device on a link, set switch 1 of switch assembly SW3 to the **up** position to disconnect the internal termination resistor. At a 1785 PLC-5 controller connected as an end device on a link, set switch 1 of switch assembly SW3 to the **down** position to connect the internal termination resistor (Figure 9.6).

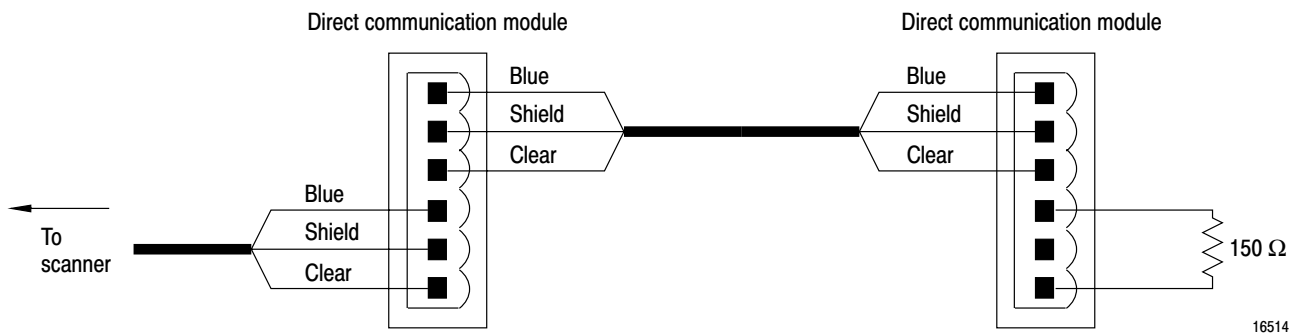
Figure 9.6
Connections to 1785 PLC-5 Controller



Connecting to a Direct Communication Module

Figure 9.7 shows I/O link connections to a direct communication module (1771-DCM) both as a middle device and as an end device on a link. The clear-insulation conductor connects to the top terminal. The blue-insulation conductor connects to the bottom terminal. At each direct communication module, connect the shield drain wire of each cable segment to give the shield continuity. However, never ground the shield at a direct communication module. At a direct communication module connected as an end device on a link, connect a 150-Ohm 1/4-Watt termination resistor across the signal lines.

Figure 9.7
Connections to Direct Communication Module

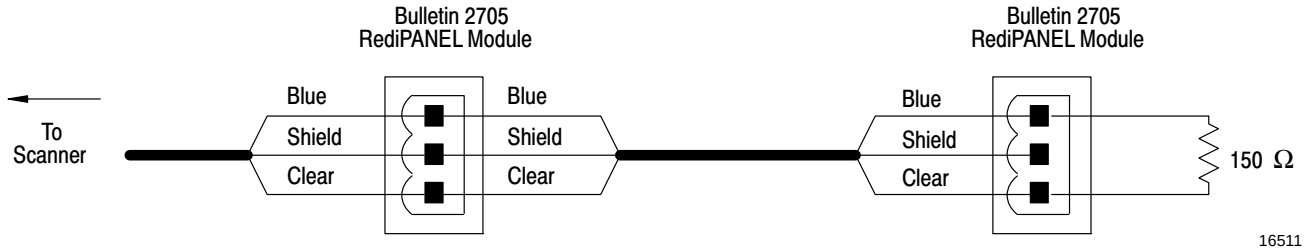


ATTENTION: Do not disconnect the connector on a middle device when the system is operating because that would cause discontinuity in the link and remove the termination. The connection between terminals is inside the module.

Connecting to a RediPANEL Module

Figure 9.8 shows I/O link connections to a 2705 RediPANEL module both as a middle device and as an end device on a link. The blue-insulation conductor connects to the top terminal. The clear-insulation conductor connects to the bottom terminal. At each RediPANEL module, connect the shield drain wire of each cable segment to give the shield continuity. However, never ground the shield at a RediPANEL module. At a RediPANEL module connected as an end device on a link, connect a 150-Ohm 1/4-Watt termination resistor across the signal lines.

Figure 9.8
Connections to RediPANEL Module

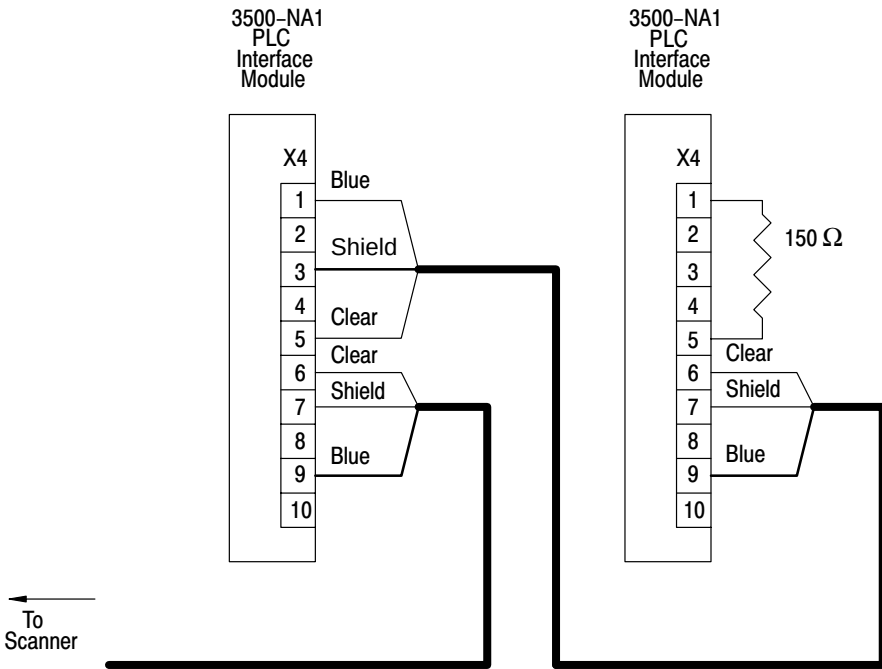


16511

Connecting to a PLC Interface Module

Figure 9.9 shows I/O link connections to a PLC interface module (cat. no. 3500-NA1) both as a middle device and as an end device on a link. Connection is to the X4 terminal strip. Terminals 1, 2, 9, and 10 are connected internally for line 1 (blue-insulation conductor). Terminals 3, 4, 7, and 8 are connected internally for the shield. Terminals 5 and 6 are connected internally for line 2 (clear-insulated conductor). At each PLC interface module, connect the shield drain wire of each cable segment to give the shield continuity. However, never ground the shield at a PLC interface module. At a PLC interface module connected as an end device on a link, connect a 150-Ohm 1/4-Watt termination resistor across the signal lines.

Figure 9.9
Connections to PLC Interface Module

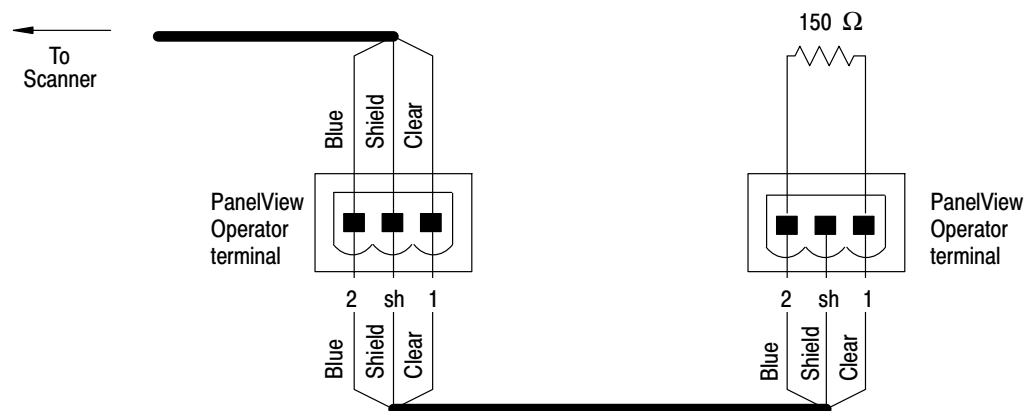


16512

Connecting to a PanelView Operator Terminal

Figure 9.10 shows I/O link connections to PanelView Operator terminal (2711 series) both as a middle device and as an end device on a link. Terminal 1 connected internally for line 1 (blue-insulation conductor). The middle terminal is connected internally for the shield. Terminal 3 is connected internally for line 2 (clear-insulated conductor). At each PanelView Operator terminal, connect the shield drain wire of each cable segment to give the shield continuity. However, never ground the shield at a PanelView Operator terminal. At a PanelView Operator terminal connected as an end device on a link, connect a 150-Ohm 1/4-Watt termination resistor across the signal lines.

Figure 9.10
Connections to PanelView Operator Terminal



16614



ATTENTION: Do not disconnect the connector on a middle device when the system is operating because that would cause discontinuity in the link and remove the termination. The connection between terminals is inside the module.

What to do Next

After you have finished connecting the I/O link cabling, proceed to chapter 10 to provide power to the I/O sub-system.

Connecting ac Power

Chapter Objectives

This chapter shows you how to make ac connections to the components.

What You Will Be Doing

If you have the following components in your system, you have to connect ac power to them.

Component:	Cat. no.:
power supply	5120-P1/B
industrial disk	5730-ID3, 5710-ID4, -ID5, -ID6, -ID7
fan chassis	5110-FAN8
I/O power supply	1771-P2,-P4,-P7
program loader	5710-PL/B

You may also be wiring an:

- isolation transformer
- master control relay



ATTENTION: Avoid ground loops. Make sure all grounds are at the same potential. Otherwise you could damage the equipment.

The following sections show you how to connect ac power to the above components.

Gather ac Wiring Documentation

Gather the ac wiring documentation to determine which components you have to connect to ac power.

Disable Inputs and Outputs

To disable inputs and outputs, follow these steps:



ATTENTION: Disable outputs and inputs before connecting ac power. If you do not, you may cause machine operation, which could cause damage to machinery and personal injury.

1. Pull down the wiring arm of each I/O module.
2. Disconnect each RS connector.
3. Put the keyswitch of the RM in Program Mode.

Power Supply

You connect the power supply to the:

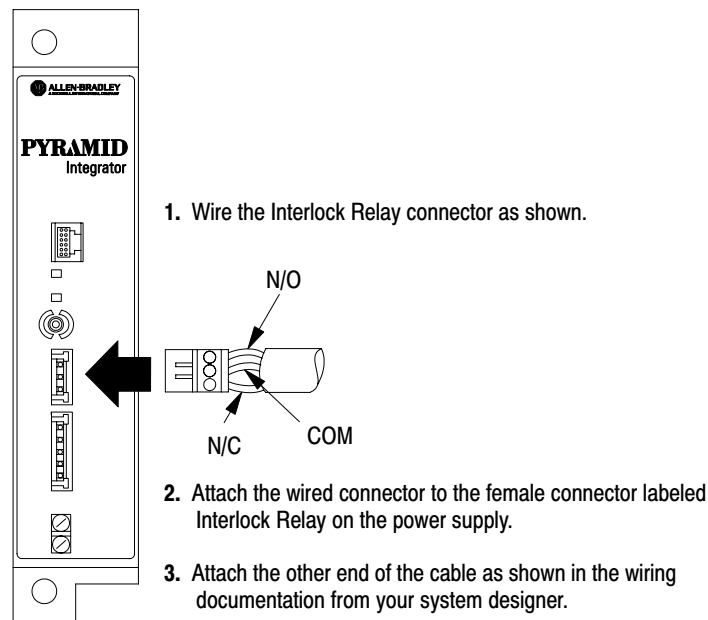
- devices you want disabled by the power interlock relay
- ac line voltage

If you are not sure how to wire the supplied connectors of the power supply, see appendix A.

Power Interlock Relay (Optional)

You can wire various devices to the power interlock relay. Check the power supply documentation from your system designer to determine which device you will be connecting (the maximum for this connection is 250V ac at 1 A).

To connect the power interlock relay, follow the steps below:



19790

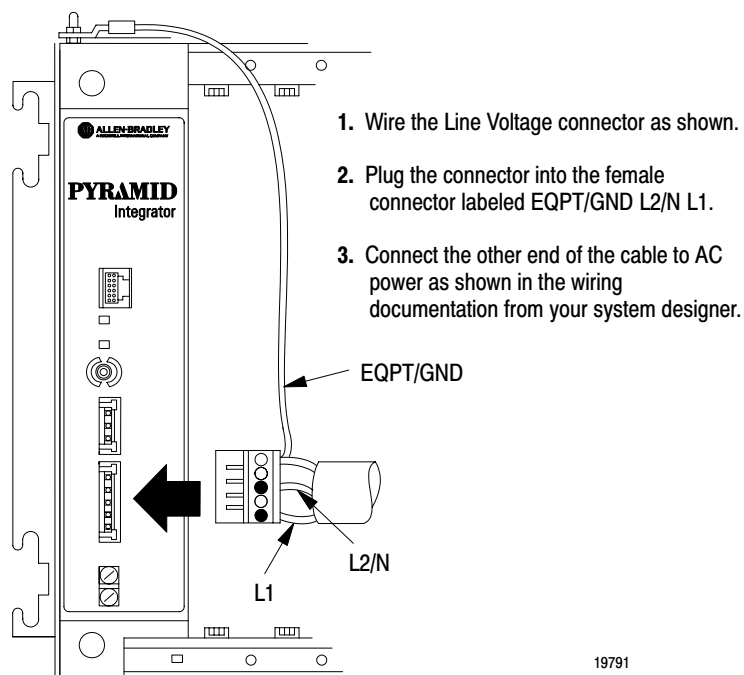
Connect ac Line Voltage

You connect the power supply to ac line voltage. The input ranges for the power supply are:

- 85 to 132V ac for 115V ac
- 170 to 264V ac for 220V ac
- 47 to 63 Hz

To connect ac power to the power supply, follow the steps below:

Important: If you are grounding the ground wire to the chassis, do not connect the top wire.



Industrial Disk

To wire ac power to the industrial disk, follow the steps below:

1. If you have not already done so, wire the terminal block for ac power as shown in chapter 5 of this manual.



ATTENTION: Make sure the ac selector switch is set to the appropriate voltage. Otherwise you may damage the equipment.

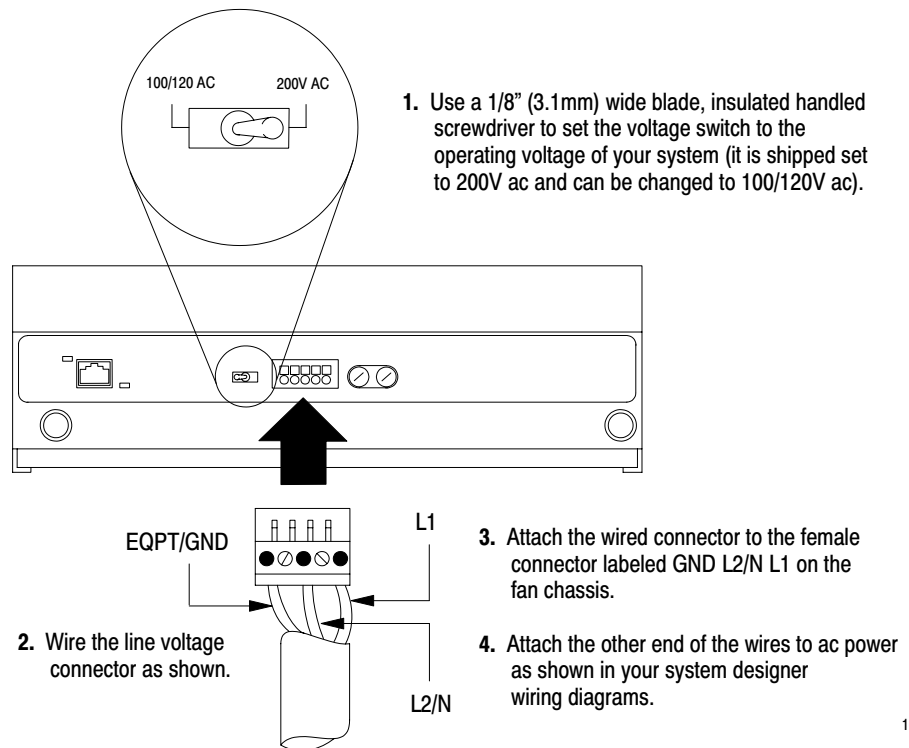
2. Attach the other end of the wires to ac power as shown in your system design wiring diagram.

Fan Assembly

You connect the fan assembly to ac power. The input ranges for the fan assembly are:

- 85 to 132Vac for 110/120V ac
- 170 to 264Vac for 220V ac
- 47 to 63 Hz

To connect the fan assembly to ac power, follow the steps below.



16797

Connecting I/O Power Supplies

Install each power supply for each I/O chassis as described in the publication shipped with each power supply.

Checking the Hardware

Chapter Objectives

This chapter outlines how to check your hardware, after you have installed it. For system startup and integration, see appendix D.

Checking the Hardware

To check your hardware installation:

- disable all inputs and outputs
- perform standalone hardware checks of
 - ac power
 - machine input/output devices
- check the PI modules in the chassis
- check the I/O modules
- check the vision components
- check the peripherals

Disable All Inputs and Outputs

Before performing any checks, disable all inputs and outputs to avoid machine operation.



ATTENTION: Disable outputs and inputs before connecting ac power. If you do not, you may cause machine operation, which could cause damage to machinery and personal injury.

1. Pull all swing arms down.
2. Disconnect any device that might cause machine motion to occur when it is energized.

Perform Standalone Hardware Check

The first checks you make are:

- ac power
- machine input/output devices

ac Power

Test each component receiving ac power. For each component receiving ac power, perform the following steps.

1. Measure the ac line voltage using a volt meter and make sure it corresponds to the power supply or component. Verify the incoming power.
2. Check the wiring of the:
 - main disconnect switch or circuit breaker
 - master control relay
 - emergency stop switches
3. Check power cable connections. Make sure connections are correct and secure.

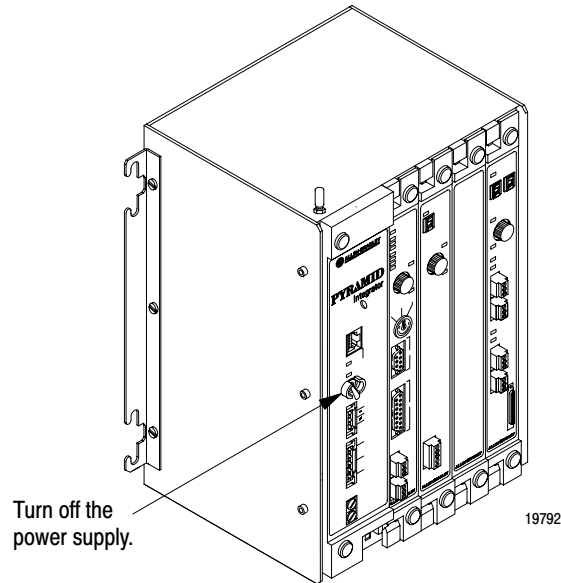
Machine Input/Output Devices

Test each machine input/output device. For each device, use a volt meter to make sure the devices are receiving the necessary power.

Check the PI Modules

Follow the steps below to test the modules in the chassis.

1. Make sure you have disabled your outputs as described in the beginning of this chapter.
2. Turn the RM key to Program.
3. Turn off the power from the power supply.



4. Apply ac power to the PI chassis only.
5. Turn on the power from the power supply.
6. And check the indicators of each module.

If you have a:	Check the LED labeled:	It should be:	If it is not:
power supply	DC OK	GREEN	- make sure you turn on the power to the power supply. - cycle power by turning off the power from the power supply and then turning it back on. - check fuses on the front of the power supply. - check ac wiring. - remove the module and make sure the voltage-selector switch is set to the correct operating voltage.
	OVER TEMP	OFF	- cycle power by turning off the power from the power supply and then turn it back on. - make sure the fan is operating. - check the fan filter installation. Arrows on the filter should be pointing upwards. - make sure there are no obstructions on the top or bottom of the chassis. - make sure the power connector is secure. - make sure the filler plates are installed.
	FAN STATUS	GREEN	make sure: - nothing is blocking the air flow on top of the chassis - the filter is inserted with the arrows pointing upwards - the filler plates are installed and secure
RM	PASS/FAIL	GREEN	- make sure you turn on the power to the power supply. - cycle power by turning off the power from the power supply and then turning it back on. - at initial power up, clear memory or re-download program.
	EXECUTE	OFF	
	OUTPUTS	OFF	
	FAULT	OFF	
	FORCES	OFF	
	CH 1	Flashing GREEN (if connected)	- make sure the connection is secure. - make sure there are no duplicate nodes. - make sure the blue and clear wires are not swapped.
	CH 2	Flashing GREEN (if configured as DH+ link)	
	CH 3	Flashing GREEN (if configured as DH+ link)	
	MEM ERR ¹	OFF	make sure the memory module is connected properly — see appendix A.
RS2	BATT LOW	OFF	make sure the battery is inserted correctly in the battery holder.
	PASS/FAIL	GREEN	- cycle power by turning off the power from the power supply and then turning it back on. - make sure you turn on the power to the power supply. - make sure the module is seated properly — see appendix A.
	CH 1	Flashing GREEN (if connected)	- make sure the connection is secure. - see RS5 on page 11-5.
	CH 2	Flashing GREEN (if connected)	
	MEM ERR ¹	OFF	make sure the memory module is connected properly — see appendix A.
	BATT LOW	OFF	make sure the battery is inserted correctly in the battery holder.

¹MEM ERR will be on at initial power up until memory is cleared or downloaded.

If you have a:	Check the LED labeled:	It should be:	If it is not:
RS5	PASS/FAIL	GREEN	- cycle power by turning off the power from the power supply and then turning it back on. - make sure the module is seated properly — see appendix A.
	CH 1	GREEN (if configured and connected)	- make sure the connection is secure. - make sure there are no duplicate or overlapping rack numbers assigned. - make sure that the rack is configured for a rack address in the range defined by the scanner pushwheels.
	CH 2	Flashing GREEN (if configured but some adapters faulted or disconnected)	
	CH 3	Flashing RED (if configured but all adapters faulted or disconnected)	
	CH 4	OFF (if not configured)	
	CH 5		
	ERROR	OFF	- note flashing error code. - cycle power by turning off the power from the power supply and then turning it back on.
BATT LOW	OFF	make sure the battery is inserted correctly in the battery holder.	
LP	PASS/FAIL	GREEN	- cycle power by turning off the power from the power supply and then turning it back on. - make sure the pushwheel number is correct. - make sure the module is seated properly — see appendix A.
	MEM ERR ¹	OFF	make sure the memory module is connected properly — see appendix A.
	BATT LOW	OFF	make sure the battery is inserted correctly in the battery holder.
CVIM module	PASS/FAIL	GREEN	- make sure the module is seated properly — see appendix A. - make sure you turn on the power to the power supply.
	TRIGGER 1	OFF	
	TRIGGER 2	OFF	
	MEMORY	OFF	
MicroVAX Information Processor module EP or EE	PASS/FAIL	GREEN	- cycle power by turning off the power from the power supply and then turning it back on. - make sure the module is seated properly — see appendix A.
	ENET	Flashing GREEN (If connected and communicating on the Ethernet network)	make sure the connection to the Ethernet network is secure.
	PROCESSOR	OFF ²	
	BACKPLANE	OFF ²	
	ERROR	OFF	- cycle power by turning off the power from the power supply and then turning it back on. - make sure the module is seated properly — see appendix A. - it will blink the error code. Call support services.
	BATTERY LOW	OFF	make sure the battery is inserted correctly in the battery holder.

If you have a:	Check the LED labeled:	It should be:	If it is not:
¹ MEM ERR will be on at initial power up until memory is cleared or downloaded.			
² These LEDs light after INTERCHANGE software has been loaded.			
MicroVAX Information Processor module	PASS/FAIL	GREEN	- cycle power by turning off the power from the power supply and then turning it back on. - make sure the module is seated properly — see appendix A.
	ENET CH A	Flashing GREEN (if connected and communicating on the Ethernet network)	make sure the connection to the Ethernet network is secure.
	PROCESSOR	OFF ²	
	BACKPLANE	OFF ²	
	ENET CH B	OFF	
	ERROR	OFF	- cycle power by turning off the power from the power supply and then turning it back on. - make sure the module is seated properly — see appendix A. - it will blink the error code. Call support services.
	BATTERY LOW	OFF	make sure the battery is inserted correctly in the battery holder.
KA module	PASS/FAIL	GREEN	- make sure you turn on the power to the power supply. - cycle power by turning off the power from the power supply and then turn it back on.
	MEM ERR ¹	OFF	make sure the memory module is connected properly — see appendix A.
	CH 1	Flashing GREEN (if connected)	make sure the connection is secure.
	CH 2	Flashing GREEN (if configured as DH+ link)	
	CH 3	Flashing GREEN (if configured as DH+ link)	
OSI Interface Module	PASS/FAIL	GREEN	- cycle power by turning off the power from the power supply and then turning it back on. - make sure you turn on the power to the power supply. - make sure the module is seated properly — see appendix A. - if cycling power doesn't work, replace the OSI Interface module.
	MODE	GREEN	download the program image using A-B MAP Station Manager.
	ACTIVITY	Flashing GREEN (if MAP interface is passing a message.)	
	MEM ERR	OFF	- cycle power by turning off the power from the power supply and then turning it back on. - make sure you turn on the power to the power supply. - if cycling power doesn't work, replace the OSI Interface module.
	BATT LOW	OFF	- make sure the battery is inserted correctly in the battery holder. - the lithium battery is weak and should be replaced.
	COMM STATUS	GREEN	- if the LED is OFF, check 802.4 cable connections. Or check slot time. - if the LED is flashing RED, reset the module through the RS-232 local interface or through a power cycle. - if the LED is RED, reset the module through the RS-232 local interface or through a power cycle. - if resetting the module doesn't work, contact your local A-B sales office.

If you have a:	Check the LED labeled:	It should be:	If it is not:
¹ MEM ERR will be on at initial power up until memory is cleared or downloaded.			
² These LEDs light after INTERCHANGE software has been loaded.			
Ethernet Interface module	PASS/FAIL	GREEN	• cycle power by turning off the power from the power supply and then turning it back on. • make sure the module is seated properly — see appendix A.
	BACKPLANE	OFF ³	
	ENET	Flashing GREEN or off (If connected and communicating on the Ethernet network)	make sure the connection to the Ethernet network is secure.
	ERROR CODE	OFF	• cycle power by turning off the power from the power supply and then turning it back on. • make sure the module is seated properly — see appendix A. • it will blink the error code. Call support services.
³ This LED lights after Network INTERCHANGE software has been loaded.			

RM or KA Module on the Communication Link

Channel:	With this protocol:	LED should be:
CH 1	Master	Flashing GREEN (when communication is occurring)
	Slave	
	DF 1 (if another device is sending you messages and you are replying)	
	DF 1 (If no other device is sending you messages)	OFF
	Inactive	OFF
CH 2 and CH 3	DH link (and there's no other activity on the network)	GREEN
	DH link (and no messages are being sent to you on the network)	OFF
	DH link (and you are replying to messages from another device on the network)	Flashing GREEN
	Inactive	OFF
	DH+ link	Flashing GREEN

Check I/O

If your configuration has I/O, your next step is to check it. To check I/O, follow the steps below.

1. Check the keying bands of each I/O module. Make sure they are installed correctly. See chapter 7 in this manual if you're unsure about installing keying bands.
2. Check the location and chassis positioning of each I/O module. Make sure it is in its proper location (chassis, rack, and slot).
3. Check the ac wiring on the I/O power supply.

4. To make sure you have wired each I/O correctly, perform a continuity test for each I/O wired.

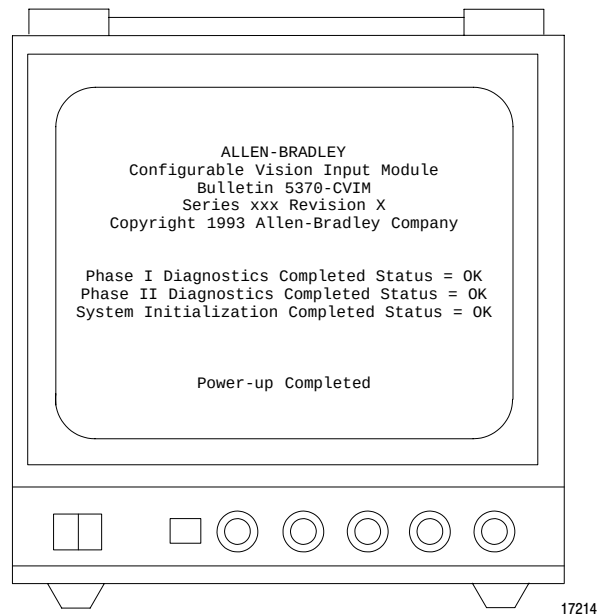
Check Vision Components

To test the vision components, follow the steps below:

1. Apply power to each vision device and make sure the PASS/FAIL indicators are GREEN.

If the indicators are not green:

- remove power
 - make sure the connections are correct and secure
 - re-apply power and re-check indicators
2. Check the monitor's screen. A message similar to the one shown below should be displayed.



If the display is not similar to the one shown above:

- remove power
- make sure the connections are correct and secure (see chapter 6)
- re-apply power and re-check the monitor's screen

Check Peripherals

To test the industrial disk (5710-ID4, -ID5, -ID6, -ID7), follow the steps below:

1. Apply power to the industrial disk.
2. Check the indicators.

The indicator labeled:	Should be:	If it is not:
CABLE PRESENT	ON (If connected to the MicroVAX Information Processor module)	make sure the cable is secure at the industrial disk and the MicroVAX Information Processor.
DRIVE #1 DATA ACCESS	OFF	the MicroVAX Information Processor is accessing the disk. This is normal.
DRIVE #2 DATA ACCESS ²	OFF	the MicroVAX Information Processor is accessing the disk. This is normal.
DISK POWER	ON	make sure the power connection is correct and secure.
PROCESSOR FAULT	OFF	cycle power. If it does not go OFF, the processor that controls the disk drive's environment has faulted. Call support services.
HEATER ON ¹	OFF	wait a few minutes. It should go OFF (if performing a cold start, this LED may stay ON for a half hour).
COOLER ON ¹	OFF	wait a few minutes. It should go OFF (if performing a hot start, this LED may stay ON for up to an hour and a half).

¹Either the HEATER ON or COOLER ON LED could be on at startup (depending on the internal temperature of the disk). If both LEDs are ON, call support services.

²The DRIVE #2 DATA ACCESS indicator is only present on 5710-ID5; it is not present on 5710-ID4. DRIVE #1 data access and DRIVE #2 data access are not present at all for 5710-ID6 and -ID7.

To test the industrial disk (5710-ID3), follow the steps below:

1. Apply power to the industrial disk.
2. Check the indicators.

The indicator labeled:	Should be:	If it is not:
CABLE PRESENT	ON (If connected to the MicroVAX Information Processor module)	make sure the cable is secure at the industrial disk and the MicroVAX Information Processor.
DATA ACCESS	OFF	the MicroVAX Information Processor is accessing the disk. This is normal.
DISK POWER OK	ON	make sure the power connection is correct and secure.
PROCESSOR FAULT	OFF	cycle power. If it does not go OFF, the processor that controls the disk drive's environment has faulted. Call support services.
ENV POWER OK	ON	disconnect power from the disk and check the fuses on the disk's power supply. If necessary, replace the 250V, 5 amp and/or 7 amp slowblow fuses.
HEATER ON ¹	OFF	wait a few minutes. It should go OFF (if performing a cold start, this LED may stay ON for a half hour).
COOLER ON ¹	OFF	wait a few minutes. It should go OFF (if performing a hot start, this LED may stay ON for a half hour).

¹Either the HEATER ON or COOLER ON LED could be on at startup (depending on the internal temperature of the disk). If both LEDs are ON, call support services.

To test other peripherals you have installed, follow the steps below:

1. Apply power to each peripheral and make sure the power indicators are on.
2. If the power indicators are off, remove power and make sure the connections are correct and secure. Re-apply power and re-check the indicators.

What to do Next

After you have successfully tested all of the installed hardware, you can begin system startup and integration.

For information on system startup and integration, see the following publications:

Module:	Documentation:	Pub. no./Cat.no.:
CVIM module	CVIM User Manual	5370-ND.001
MicroVAX Information Processors	INTERCHANGE Software (BPI version) Documentation Set	5730-DTLD
Ethernet Interface module	INTERCHANGE Software (EI version for VAX) Documentation Set	5730-VDOC
	INTERCHANGE Software (EI version for HP-UX) Documentation Set	5730-HPUD
RM	PLC-5/250 Programming Software Documentation Set	6200-N8.002
LP	PLC-5/250 Programming Software Documentation Set	6200-N8.002
RS	PLC-5/250 Programming Software Documentation Set	6200-N8.002
KA	PLC-5/250 Programming Software Documentation Set	6200-N8.002
OSI interface module	Allen-Bradley MAP Station Manager Software User's Manual	6630-6.5.2

Configuring Hardware for the MicroVAX Information Processors

Chapter Objectives

This chapter shows you how to start up and test the MicroVAX Information Processor hardware and set hardware defaults. To configure the hardware, you must complete the following tasks:

- start up and test the hardware
- format the industrial disk
- set hardware defaults

Gather Your Equipment

You need the:

- MicroVAX Information Processor
- terminal or workstation (VT220, VT240 or compatible, VT320, VT340 or compatible)
- program loader
- documentation that came with the above hardware
- MicroVAX Information Processor, or EP or EE worksheets
- communications wiring, labeling diagram
- industrial disk

Start Up and Test MicroVAX Information Processor Hardware

Starting up and testing MicroVAX Information Processor hardware requires:

- checking module indicator lights
- setting up the terminal and connecting it to the processor module
- running power-up diagnostic self-tests
- running system exerciser tests
- formatting industrial disk
- configuring defaults

Checking Module Indicator Lights

Use the following table to check the module indicator lights.

Check the LED labeled: ¹	It should be:	If it is not:
PASS/FAIL	GREEN	• cycle power by turning off the power from the power supply and then turning it back on. • make sure the module is seated properly, see appendix A.
ENET A ² or ENET	Flashing GREEN (If connected and communicating on Ethernet)	make sure the Ethernet connection is secure.
PROCESSOR	OFF ¹	
BACKPLANE	OFF ¹	
ERROR	OFF	• cycle power by turning off the power from the power supply and then turn it back on. • make sure the module is seated properly — see appendix A. • note the blinking error code; count the flashes between pauses and be prepared to give that information to support services.
BATTERY LOW	OFF	Make sure the battery is inserted correctly in the battery holder.

¹ These LEDs light after Interchange software has been loaded.

² ENET A is for the MicroVAX Information Processor and ENET is for the MicroVAX Information Processor EP or EE.

Connecting the Program Loader

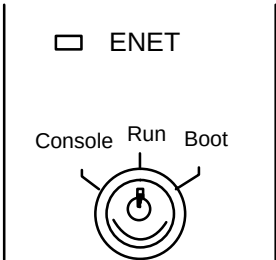
If you are using the program loader (series A or B), you should have already connected it to the module. Make sure you have rebooted the system at least once since the program loader was connected, or the MicroVAX Information Processor will not recognize that the program loader is connected. See the *Program Loader Installation Data* (5000-2.93) for more information.

Setting Up the Terminal

To set up the console terminal, complete the following steps:

1. Attach the terminal to port 3 (OPA0) on the distribution panel.
2. Set the terminal to:
 - 9600 baud
 - transmit = receive
 - 8 bits
 - no parity
 - 1 stop bit
 - no local echo

Changing Modes and Booting the Hardware



Use the keyswitch on the MicroVAX Information Processor to change the operating mode of the MicroVAX Information Processor. The three modes are:

- Console
- Run
- Boot

To switch mode, turn the keyswitch to that mode position.

Table 12.A
MicroVAX Information Processor Module Keyswitch

To:	Use this position/mode:	The keyswitch:
run self-tests and system utilities, and configure hardware defaults	Console	stays in Console position until you turn it. The key cannot be removed from the switch.
boot or reboot the processor. The processor comes up either running VMS or in console mode (where the prompt is >>>), depending on how the default recovery is set. For more information, see the Setting Default Recovery section later in this chapter.	Boot	automatically returns to the Run position.
operate normally	Run	stays in Run position until you turn it. The key can be removed from the switch.

Run Power-up Diagnostic Self-test

Each time the MicroVAX Information Processor is powered up, it runs a series of self-tests. The test results are displayed and then you see the Console prompt. Once the Console prompt is displayed, you can run self-tests on individual devices or call up the system configuration table to look at test results.



ATTENTION: Do not power down the MicroVAX Information Processor before the power-up self-test is completed. If the power-up sequence is interrupted, the hardware defaults in the non-volatile random-access memory may become corrupted.

See Power-up Self-test

To see the power-up self-test display, power up the system.

1. Make sure the terminal is set up and connected to port 3 on the distribution panel.
2. Power up the MicroVAX Information Processor and the terminal. If they are already on, reboot them by turning the module's keyswitch to Boot. You should see a similar display like this one:

```
KA42-IN V1.0  
F...E...D...C...B...A...9...8...7...6...5...4_...3...2...1...
```

There should be a _ after the F, 4, and 3.

If you see:	It means:
. . .	device tested successfully or has a soft error.
? . .	device has a hard error. To find out more information, use TEST 50 to see the system configuration display.
_ . .	device not installed or not tested.
* . .	device installed but its ROM is destroyed.

3. Look at the self-test error summary that is displayed after the self-tests are complete. The summary displays all of the hard and soft errors found during the tests.

If the system detects this during power-up:	Next to the devices where the error occurred, you will see:
Hard error	?? Also, the system will not be able to boot automatically.
Soft error	?

KA42-IN V1.0			
F_..E...D...C...B...A...9...8?...7...6...5...4_..3_..2...1...			
?	E	0040	0000.0005
??	8	00F0	0000.0300

Table 12.B tells you what each test number represents.

Table 12.B
Test Numbers and Device Mnemonics

This test number:	Represents this device:	And this mnemonic:
F	not used	--
E	time of year clock	CLK
D	non-volatile RAM	NVR
C	DZ controller (serial line controller)	DZ
B	memory	MEM
A	memory management unit	MM
9	floating point unit	FP
8	interval timer	IT
7	disk controller (and disk drives)	HDC, ¹ SCSI-A ²
6	tape controller (and program loader)	TPC, ¹ SCSI-B ²
5	interrupt controller and Ethernet ID ROM	SYS
4	not used	--
3	not used	--
2	dual port RAM	BPI
1	Ethernet	NI

¹ MicroVax Information Processor (cat. no. 5730-CPU1) only

² MicroVax Information Processor EP or EE (cat. no. 5731-CPU1, -CPU2) only

If an error summary is displayed, you should look at the system configuration table. This table displays error codes that help you determine whether or not to replace the module or a device. The table also displays the MicroVAX Information Processor's Ethernet address. For more information, see page 12-7.

Run Self-test on Individual Devices

To test individual devices, follow this procedure:

1. Make sure you are at the console prompt:

>>>

2. Enter the **TEST** command and the number of the device you want to test. For example, to self-test the floating point unit (FP), you would enter: **TEST 9**

You can also run self-tests on a range of devices by entering the first and last number of the range. For example, to test devices C through 7, you would enter: **TEST C 7**

To test all devices, enter: **TEST F 1**

See [Table 12.B](#) for test numbers to use for testing the devices.

3. View the results of the self test.

If the test was:	You will see the self-test number followed by:
Successful	. . . For example, a successful self-test of the floating point unit looks like this: 9 . . .
Not successful	? . . and the message 84 FAIL . For example, an unsuccessful self-test of the floating point unit looks like this: 9? . . 84 FAIL

To find out what the error is, display the system configuration table.
For more information, go to the next section.

Display Self-Test Error Codes in System Configuration Table

To see the error codes for all tested devices, bring up the system configuration table. This table gets updated every time the MicroVAX Information Processor is powered up or a self-test is run.

1. At the console prompt, enter: **TEST 50**

You will see the system configuration table looks similar to this:

```
KA42-IN V2.1
ID 00-00-BC-01-01-C7

CLK          0000.0001
NVR          0000.0001
DZ          0000.4001 V0.1
00000001 00000001 00000001 00004001 00000000 00000000
MEM          0002.0001
00200000 000000002
MM           0000.0001
FP           0000.0001
IT           0000.0001
SCSI-A       2828.0001
1000.0001 FFFFFFF05 FFFFFFF05 FFFFFFF05 FFFFFFF05 FFFFFFF05 FFFFFFF05
SCSI-B       1C1C.0001
1000.0001 FFFFFFF05 FFFFFFF05 FFFFFFF05 FFFFFFF05 FFFFFFF05 FFFFFFF05
SYS          0000.0001
BPI          0000.0005 V0.7
NI           0000.0001
```

2. Use the error codes in Table 12.C to trouble-shoot the MicroVAX Information Processor's hardware. For more information, see the *VAXstation™ 3100 and MicroVAX 3100 Maintenance Guide* or call your service representative.

Important: Before you replace any hardware, be sure to check the cabling and wiring. Also make sure the modules, disk drives, and program loader are properly connected and powered-up.

Table 12.C
Hardware Self-test Error Codes

If this device:	Displays this self-test error code:	Then:
CLK	0000.0001	the device is good.
	0000.0005	set the system time.
	<>0000.0001	replace the module.
NVR	0000.0001	the device is good.
	0000.0005	set system time after replacing the module battery.
	<>0000.0001	replace the module.
DZ	0000.0001 or 0000.4001	the device is good.
	<> 0000.0001 or <>0000.4001	replace the module.
MEM	00XX.0001 (and X=number of Mbytes of memory)	the device is good.
	<>00XX.0001	replace the module.
MM	0000.0001	the device is good.
	<> 0000.0001	replace the module.
FP	0000.0001	the device is good.
	<> 0000.0001	replace the module.
IT	0000.0001	the device is good.
	<> 0000.0001	replace the module.

If this device:	Displays this self-test error code:	Then:
HDC ¹	7770.0001	0 disks are connected to the module and the device is good.
	7710.0001	1 disk is connected to the module and the device is good (DUA1).
	7110.0001	2 disks are connected to the module and the device is good (DUA0).
	7ABC.WXYZ	where: A = drive DUA1 B = drive DUA0 X = control status for DUA1 Y = control status for DUA0
	if either X or Y is: 2, 4, 6, 8, A, C, E	there is a fatal error. Replace disk or call A-B representative.
	if either X or Y is: 5,F	check to see if disk is formatted. If the disk is formatted, it indicates a controller error. Call A-B representative.
	if either X or Y is: 3,9	it is a warning. Try again.
	7777.7777	check that drive has power and cables are properly connected, replace the specified disk.
TPC ¹	0000.0001	the tape controller and the program loader are good.
	0000.4001	the tape controller is good and the program loader is not connected.
	WXYZ.0001 and WX=YZ and WX<>YZ	then the module is communicating with the program loader. disconnect the program loader cable (turn off program loader, unplug data cable, then unplug power cable. See Appendix B for more information) and run the self-test again (TEST 6). - if you don't see 0000.4001, replace the cable and run the self-test again. - if you see 0000.4001, reconnect the cable, power down the system and power up the system again. Run the self-test again. You should then see 1212.0001. If you don't see 1212.0001, run the system exerciser.
	WXYZ.ABCD and CD>01	replace the module.
	and B is: 1 2 3	check that program loader has power and cables are properly connected then: replace the module. replace the program loader. replace both.
	and A is: 1	check that program loader has power and cables are properly connected then: retest TPC.
	3	retest the program loader.
	4	replace the module and the program loader.
	5	the controller doesn't recognize the program loader. Follow the procedure above for when WX<>YZ.
	6	retest TPC and the program loader. Follow the procedure above for when WX<>YZ.
	7	replace the program loader.

¹ MicroVAX Information Processor (cat. no. 5730-CPU1) only.

If this device:	Displays this self-test error code:	Then:
DUALP ¹	0000.0005 or 0000.0001	the device is okay.
	<> 0000.0005 or <>0000.0001	replace the module.
SCSI-A ²	FFFFFF03	SCSI bus controller is connected to module and device is good.
	00000001	disk drive is connected to module and device is good.
	01000001	tape drive is connected to the module and device is good.
	FFFFFF05	device is offline or not installed at this address. The SCSI ID may be set incorrectly or the cabling may be disconnected. Check the cabling and SCSI ID, then retest.
	FFFFFFF	device not tested – possible SCSI bus controller error
SCSI-B ²	FFFFFF03	SCSI bus controller is connected to module and device is good.
	00000001	disk drive is connected to module and device is good.
	01000001	tape drive is connected to the module and device is good.
	FFFFFF05	device is offline or not installed at this address.
	FFFFFFF	device not tested – possible SCSI bus controller error.
SYS	0000.0001	the device is good.
	<> 0000.0001	replace the module.
BPI ²	0000.0001	the device is okay.
	<>0000.0001	replace the module.
NI	0000.0001	the Ethernet port and cable are good.
	>0000.0001 < 0000.7001	replace the module.
	>= 0000.7001	install both T-connector terminators from the service kit and run the test again. If you see 0000.0001, then replace the cable. If you do not see 0000.0001, replace the module.

¹ MicroVAX Information Processor (cat. no. 5730-CPU1) only.
² MicroVAX Information Processor EP or EE (cat. nos. 5731-CPU1, -CPU2) only.

- Record the Ethernet address. It is on the second line of the system configuration display table. For example:

ID 00-00-BC-01-01-C7

Run System Exerciser

You can use the system exerciser to:

- test interaction between MicroVAX Information Processor devices
- help determine the cause of intermittent problems
- give more information about errors associated with the SCSI PORT or LOADER

The MicroVAX Information Processor tests each device individually during the first pass and displays error codes for each device tested. Then it tests all the devices together and displays another set of error codes. This procedure should take about 11 minutes.

To run the system exerciser:

1. Be sure you are at the console prompt.
2. Enter : **TEST 0**
3. The system begins testing individual devices. Watch the screen for the first set of error codes.

Important: The following is only a sample test 0.

```
KA42-IN V2.1      01      CU
C 0080            DZ      0000.001 14      10050      00:00:35
B 0010            MEM     0010.0001        5          0 00:01:12
7 0090            SCSI-A  6000.0001      22 0002      0 00:02:23
6 00A0            SCSI-B  3200.0001
                       6000.0001      15 0002      0 00:02:56
                       2200.0001
                       3200.0001
                       7200.0001
2 00A1            BPI     0000.0001        1          0 00:03:06
1 00C0            NI      0000.0001        9          0 00:04:01
```

4. The system then tests the devices together. When testing is complete, the final error codes are displayed. Use [Table 12.D](#) to interpret the results.

Important: Before you replace any hardware, be sure to check the cabling and wiring. Also make sure the modules, disk drives, and program loader are properly connected and powered-up.

Table 12.D
System Exerciser Display Codes

If this device:	Displays this system exerciser error code:	And:	Then:
DZ	0000.0001 or 0000.4001	--	the device is good.
	<> 0000.0001 or <>0000.4001	--	replace the module.
MEM	XXXX.0001	XXXX is number of pages of memory tested	the device is good.
	<>XXXX.0001	--	replace the module.
HDC ¹	XXXX.0001	no hard drives are connected	the module is good.
	<>XXXX.0001	no hard drives are connected	replace the module
	<>XXXX.0001	one or two drives are connected and code XXXX.0001 is displayed when no hard drives are connected	one or both of the hard drives needs to be replaced. Test each configured to module separately to determine which (or both) is bad.
TPC ¹	8000.0001	the program loader is connected	the program loader and module are good.
	<>8000.0001	the program loader is connected	replace the program loader.
	XXXX.XXXX	a program loader is not connected	the module is good.
SCSI-A ²	XXXX.0001	--	the device is good.
	<>XXXX.0001	--	replace the module.
SCSI-B ²	XXXX.0001	--	the device is good.
	<>XXXX.0001	--	replace the module.
BPI ²	0000.0001	--	the dual port is good.
	<>0000.0001	--	replace the module.
NI	0000.0001	--	the Ethernet port and cable are good.
	<>0000.0001	--	replace the module.

¹ MicroVAX Information Processor (cat. no. 5730-CPU1) only.

² MicroVAX Information Processor EP or EE (cat. nos. 5731-CPU1, -CPU2) only.

Verify and Format Disk (for 5730-CPU1)

We recommend that you verify the industrial disk in your configuration before you format or begin installing software on it. The verification procedure will tell you if:

- the disk has been formatted
- the disk is in good condition

Verify Disk

The names of the disks you have are:

DUA0 = disk 1
DUA1 = disk 2

To verify a disk, follow this procedure.

1. Make sure you are at the console prompt, then enter: **TEST 71**
2. You see:

```
VSmsv QUE-unitno (0-1)?
```

3. Enter 0 to verify disk DUA0 or 1 to verify disk DUA1.

If you see:

```
VSmsv_STS_Siz . . . . . RD54
```

```
VSmsv_QUE_RUsure (DUA0 1/0) ?
```

then the disk has already been formatted.

If you see:

```
VSmsv_STS_Siz . . . . . ??
```

```
VSmsv_RES_Err #2  
84 FAIL  
>>>>
```

then the disk has not been formatted or a problem has occurred. Go to the formatting procedure in the next section.

4. To make sure the formatted disk is in good operating condition, enter **1**.

If you see a display similar to this:

```
VSmsv_STS_RDing . . . . . OK
```

```
VSmsv_STS_OBBcnt = 14
```

```
VSmsv_NBBcnt - 0
```

VSmsv_RES_Succ

>>>

then the disk is in good operating condition. Go to the Setting Defaults section, to continue starting up the MicroVax Information Processor hardware.

If you see a display similar to this:

VSmsv_STS_NBBcnt = X

and X is Greater than 50, then replace the disk.

Format Disk

To format a disk, follow the procedure below.

Important: The formatting procedure erases the entire disk. If you have information on the disk that you want to save, copy it to another disk before beginning this procedure.

1. Be sure you are at the console prompt, then enter: **TEST 70**
2. You see:

KA630-IN RDRXfmt

VSfmt_QUE_unitno (0-2)?

Enter: 0 to format Disk 0 or 1 to format Disk 1.

If you see:

VSfmt_STS-Siz

then everything is working normally.

If you see:

VSfmt_RES-ERR #1

then you typed an incorrect number. Start over by entering **TEST 70** again. If the message continues to appear, call your service representative.

3. When you see:

```
VSmsv_STS_Siz . . . . . RD54
```

the formatter program is determining the type of disk it is formatting.

If you see:

```
VSmsv_STS_Siz . . . . . ??
```

or

```
VSmsv_RES_Err #2
84 FAIL
>>>>
```

then replace the disk.

4. When you see:

```
VSfmt_QUE_SerNBR (0-999999999)?
```

enter the serial number of the disk (it should be on the packing slip).
If you do not have a serial number, assign a unique number to it.
Record the number on your MicroVax Information Processor worksheet.

5. When you see:

```
VSfmt_QUE_RUsure (DUA0 1/0) ?
```

enter: 1 to continue the formatting procedure.

While the disk is formatting, these messages gradually appear:

```
VSfmt_STS_rdMBB . . . . . ??
```

```
VSfmt_STS_FMTing. . . . . OK
```

```
VSfmt_STS_ChkPass. . . . . .OK
VSfmt_STS BBRvec : = n
```

```
VSfmt_RES_Succ
```

The actual formatting takes about 45 minutes. When you see the last line of the display, the procedure is complete and the disk is ready to be used. Return to the previous section and verify the disk.

To discontinue the formatting procedure enter: 0. You will see this message:

```
VSfmt_RES_Abtd
84 FAIL
>>>
```

You will have to begin the formatting procedure over if you wish to format the disk.

Formatting the Industrial Disk (for 5731-CPU1, -CPU2)

To format an industrial disk, complete the following procedure.

Important: The formatting procedure erases the entire disk. If you have information on the disk that you want to save, copy it to another disk before beginning this procedure.

1. Be sure you are at the console prompt, then enter: **TEST 75**
2. You see:

```
PV_SCS_FMT_CHN (0=SCSIA \ 1=SCSIB)?
```

To format the disk, enter: **0**

3. You see:

```
PV_SCS_FMT_ID (0,1,2,3,4,5,6,7)?
```

Enter the address of the disk drive you want to format.

4. You see:

```
PV_SCS_FMT_RUsure (1/0) ?
```

To continue the formatting procedure, enter: **1**

While the disk is formatting, this message displays:

```
PV_SCS_FMTing....
```

The actual formatting takes about 40 minutes. When you see the following messages, the procedure is complete and the disk is ready to be used:

```
PV_SCS_FMT_BBrep1=0
PV_SCS_FMT_SUCC
>>>
```

To discontinue the formatting procedure, enter: **0**
You will see this message:

```
PV_SCS_FMTex
>>>
```

You will have to initiate the formatting procedure again if you wish to format the disk.

Set Hardware Defaults

After you have determined that the MicroVAX Information Processor hardware is working correctly and the disk(s) you are using are formatted, you will set two system defaults:

- default boot device
- default recovery mode

Set Default Boot Device

The default boot device holds the VMS software that the MicroVAX Information Processor uses.

If you are using:	To use this device as the default:	Set default device to:
MicroVAX Information Processor (cat. no. 5730-CPU1)	disk 0 (in port)	DUA0
	disk 1 (out port)	DUA1
	remote disk on the network (if MicroVAX is booting off a cluster)	ESA0
	program loader tape drive	MUA0
MicroVAX Information Processor EP or EE (cat. no. 5731-CPU1, -CPU2)	disk 0	DKA0
	disk 1	DKA100
	remote disk on the network (if MicroVAX Processor is booting off a cluster)	ESA0
	program loader tape drive	MKB100

To set the default boot device:

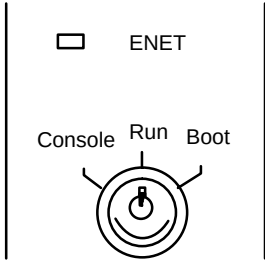
1. Make sure you are at the console prompt, then enter: **TEST 51**
2. When you see:

```
. . . . ? >>>
```

type the name of the boot device and press **[ENTER]**. For example:

```
DKA0 [ENTER]
```

Set Default Recovery



The setting you choose determines what happens when you boot the MicroVAX Information Processor by turning the module’s keyswitch to the **Boot** position.

The MicroVAX Information Processor module comes set to default setting 2. We recommend you set the MicroVAX Information Processor to setting 1 so the MicroVAX Information Processor will always reboot the hardware and come up running VMS.

Set default to:	So when the system software goes down, the MicroVAX Information Processor:	So when powering up after losing power, the MicroVAX Information Processor:
1	reboots hardware and software to VMS level	reboots hardware and software to VMS level
2	reboots hardware and comes up in console mode	reboots hardware and software to VMS level
3	reboots hardware and comes up in console mode	reboots hardware and comes up in console mode

To set the default recovery:

1. Make sure you are at the console prompt, then enter: **TEST 53**
2. When you see:

2 ? >>>

type the number of the desired default recovery procedure and press **[ENTER]**.

To keep the same default, press **[ENTER]**.

What to do Next

Now that you have configured the MicroVAX Information Processor module hardware, see *INTERCHANGE Software for PI MicroVAX Documentation Set* (5730-DTLD) to install and configure the MicroVAX Information Processor software (or INTERCHANGE software). You will also find information on starting up VMS operating software and securing VMS license PAKs.

Installing and Removing a Module

What's in this Appendix

This appendix shows you how to:

- change a memory module
- install a PI module in the chassis
- remove a PI module from the chassis
- install filler plates
- wire the connectors that come with some of the modules

Changing a Memory Module

The following modules have a memory module:

- RM
- RS2
- LP

If you are changing a memory module, do so in a static safe environment and follow the procedure below.



ATTENTION: If you perform operations on a module improperly, you may cause an electrostatic discharge, which can damage the module. Perform internal operations, such as installing the memory module, only in a static safe environment. As a minimum, we recommend the 3M Type 8005 Portable Field Service Grounding Kit or its equivalent for providing a static-safe environment.

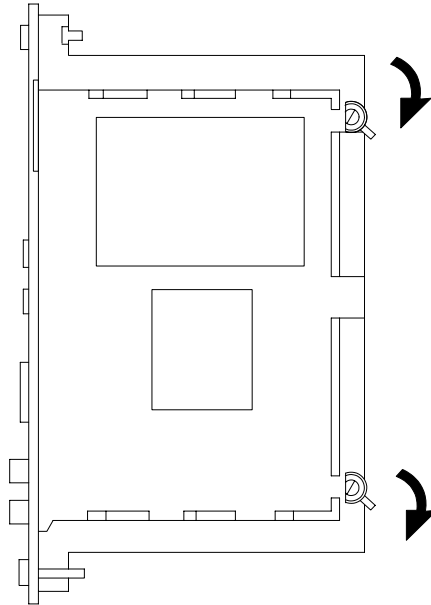
Important: Turn the power supply off before removing module from the chassis. Otherwise, you might destroy the memory.

Newer revisions of the RM, RS2 and LP have their memory module attached with screws. Before you replace memory module, remove the screws and detach the ribbon cable connector, then replace the memory module.

Removing a Memory Module

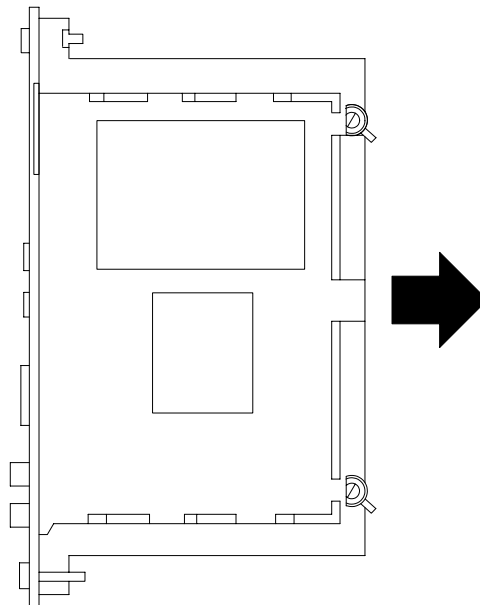
To remove a memory module, follow the steps below:

1. Release the locks to open the module.



17220

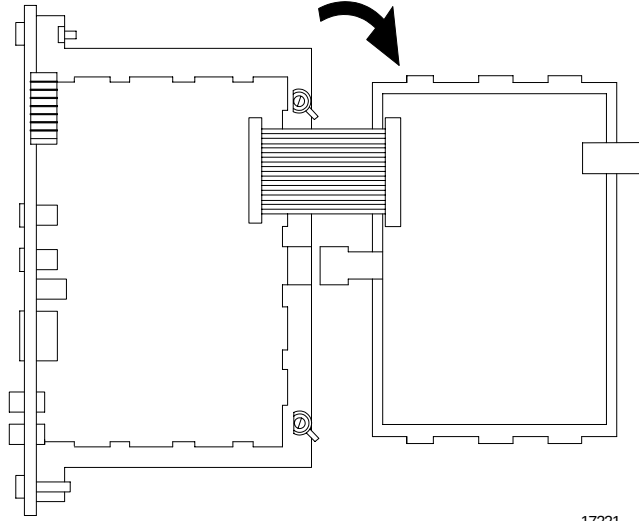
2. Slide the thumb tab to the right, then lift gently.



16789

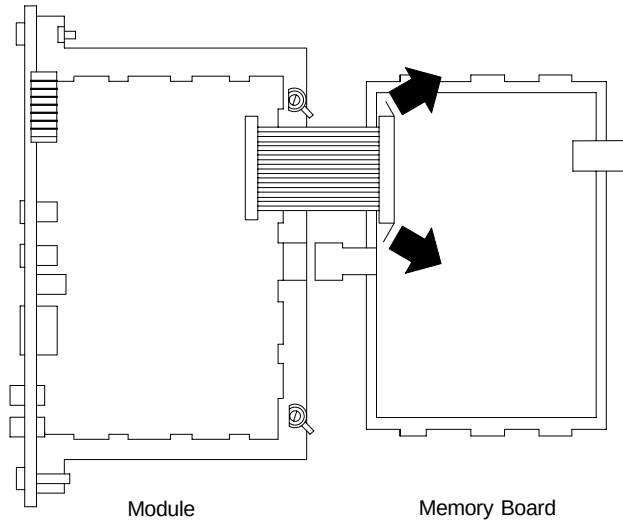
3. Pull the thumb tab slightly further right, then insert your fingers under the left edge of the memory board and lift.

Flip the memory board over to expose the connector.



17221

4. Push out the locking tabs to separate the connectors and pull the memory board from the module.



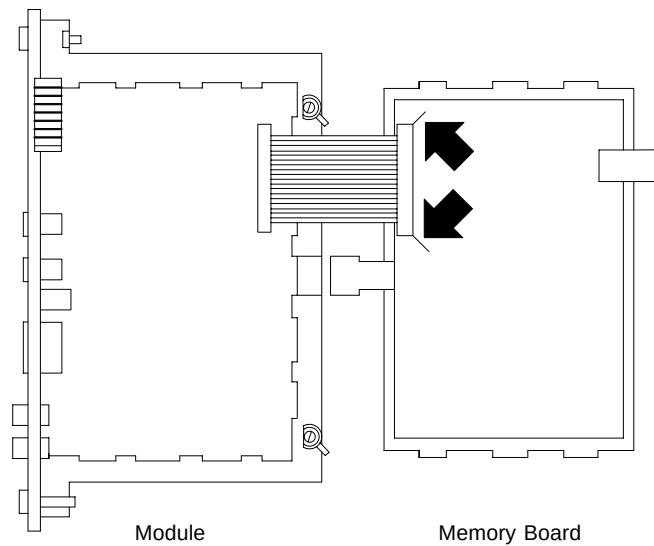
16791

You can now install a new memory board.

Installing a Memory Module

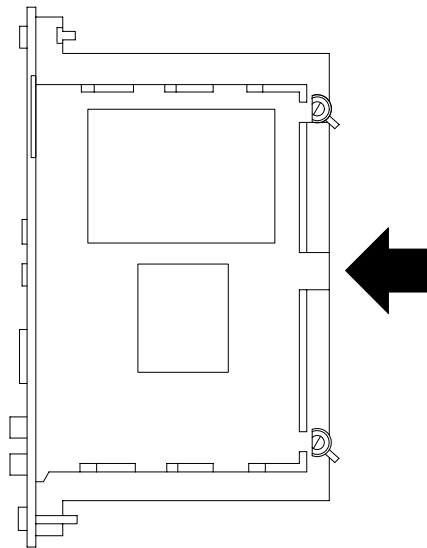
To install a memory module, follow the steps below.

1. Connect the ribbon connectors. Make sure the locking tabs are “in”.



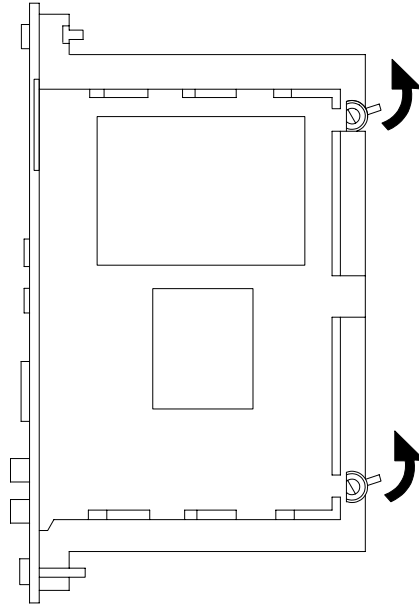
17222

2. Flip the memory board over, align the battery holder with the battery hole on the front panel and slide the memory board into place.



17223

3. Close the locks.

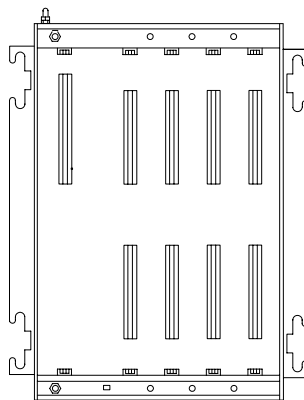


17224

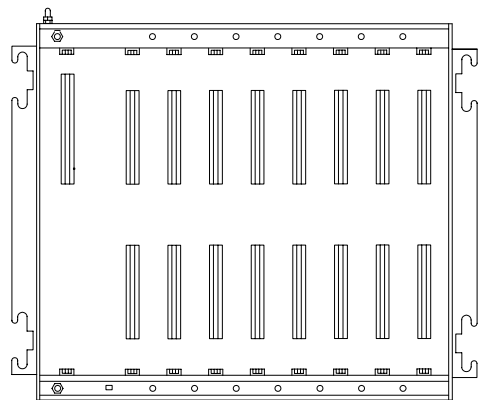
Installing a PI Module in the Chassis

To install a module in the chassis, follow the steps below:

1. Check the module worksheet to determine which slot to install the module.



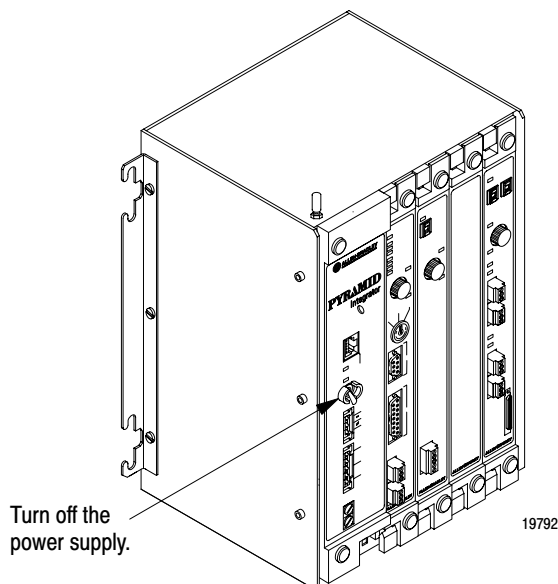
4-slot chassis (5110-A4/B)



8-slot chassis (5110-A8/B)

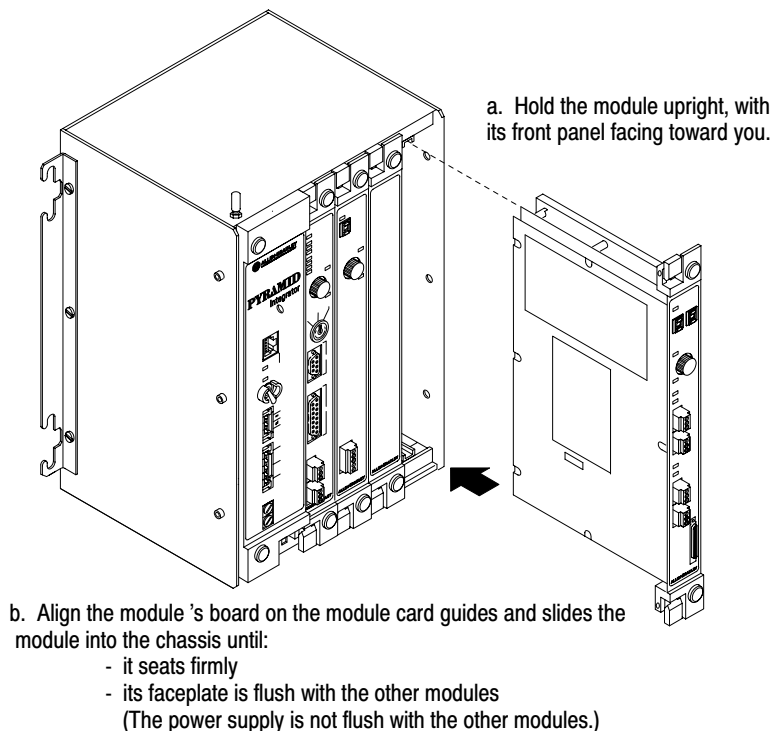
19775

2. Turn off the power supply.

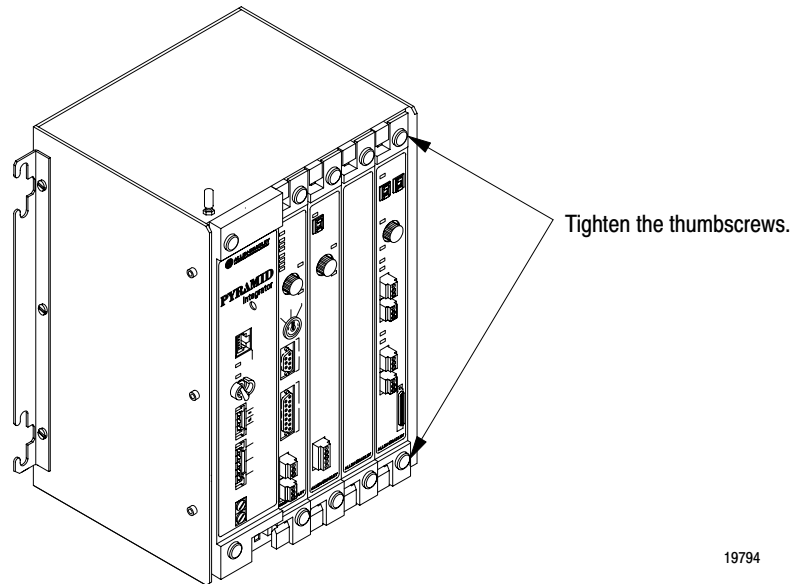


3. Insert the module into the chassis.

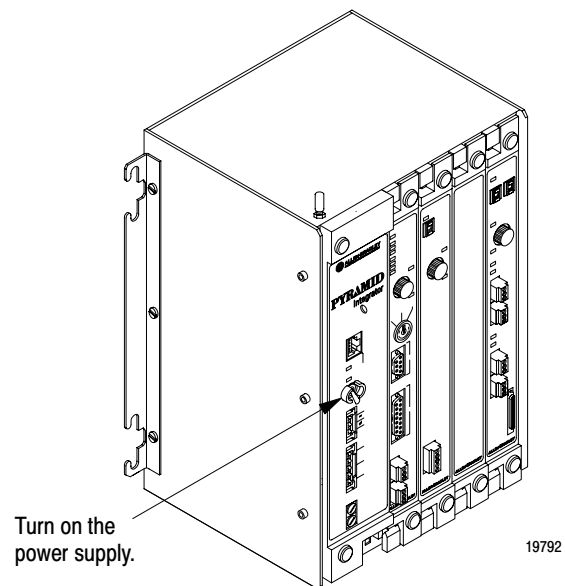
Important: Make sure the module is firmly seated in the chassis backplane before you secure the module in the chassis using the thumbscrews.



4. Secure the module in the chassis.



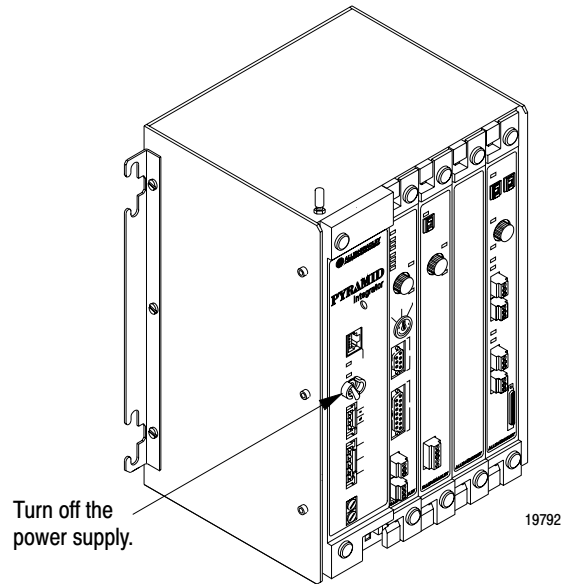
5. Turn on the power supply.



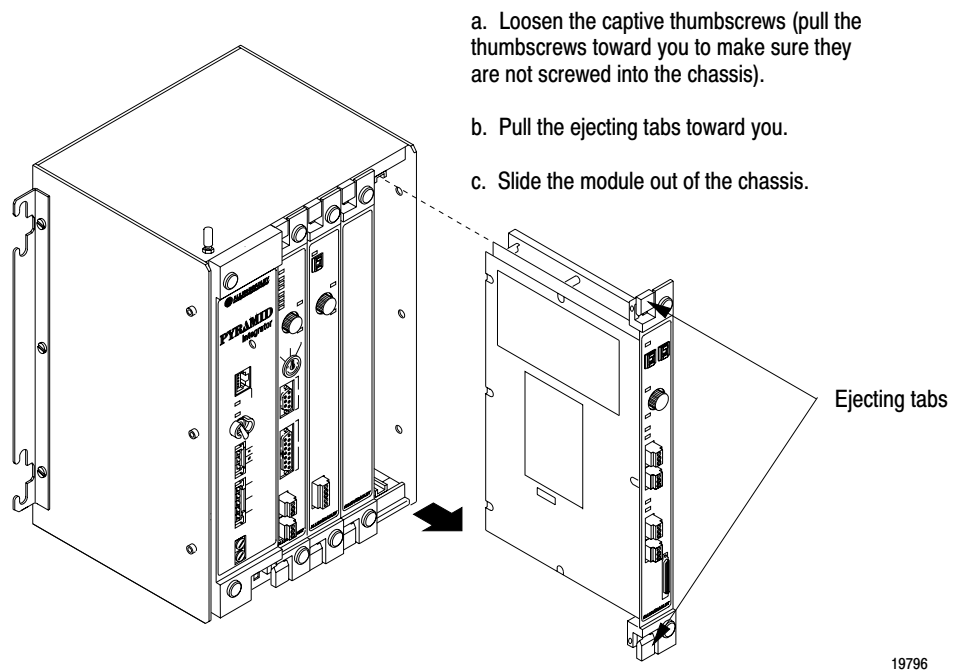
Removing a PI Module from the Chassis

To remove a module from the chassis, follow the steps below.

1. Turn off the power supply.

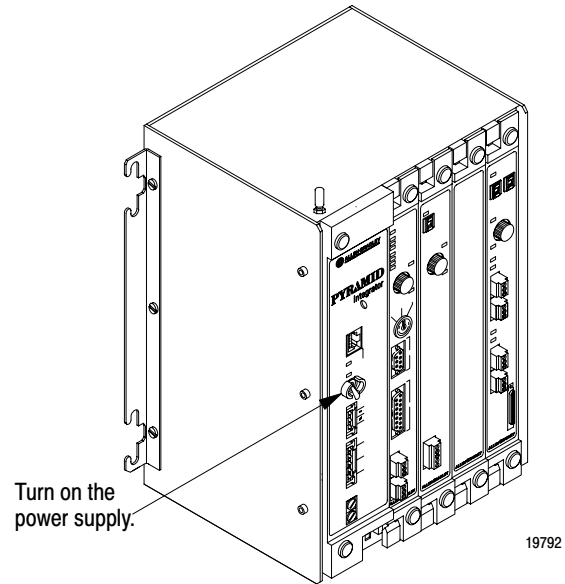


2. Remove the module from the chassis.



3. If you are replacing a module, insert the new module into the chassis. If you are not replacing the module, install a filler plate. See [page A-10](#).

4. Turn on the power supply.



Installing Filler Plates

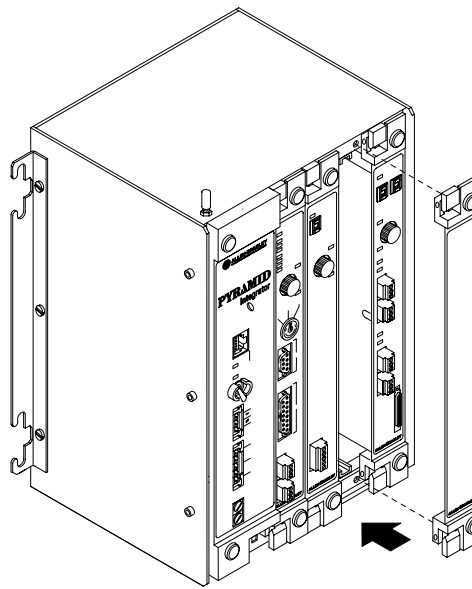
To protect the chassis and maintain air flow through the chassis, you must install filler plates (5110-FP) in all empty module slots. Filler plates also aid in cooling the chassis when a fan chassis is connected to the chassis.



ATTENTION: Install filler plates in empty slots. If you do not, air will not flow properly through the chassis and noise immunity will be reduced.

Follow the steps below to install filler plates.

1. Check the module documentation to locate the empty slot or slots.
2. Attach the filler plate to the empty slot.



- a. Place the filler plate over the empty slot.
- b. Tighten the thumbscrews.

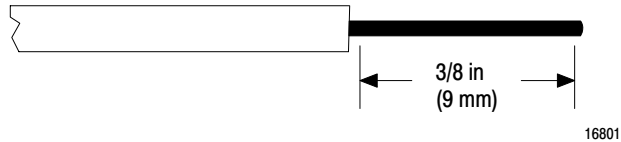
19792

How to Wire a Connector

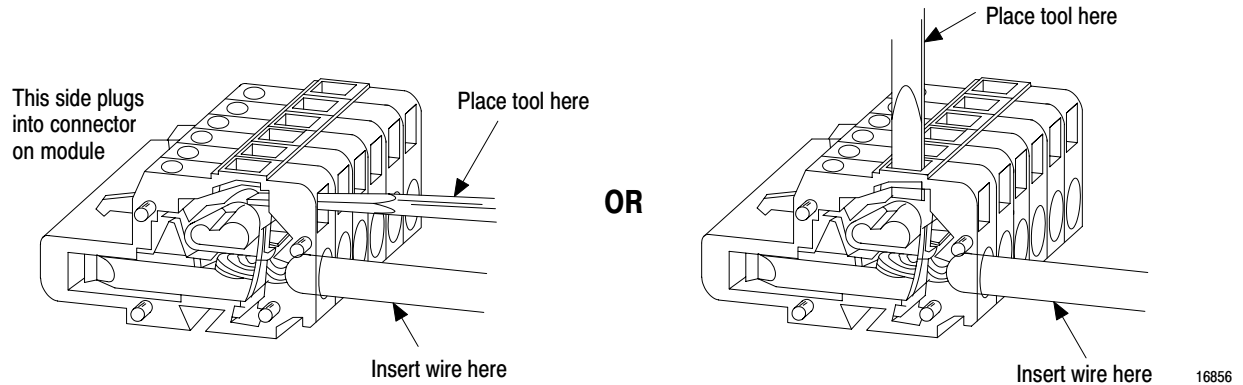
Many of the connections you will make to a module are made to connectors which you attach to another connector on the module.

To wire one of these connectors, follow the steps below:

1. Strip about 9 mm (1/4 to 3/8 in) insulation from the end of the wire.



2. Insert the wire into the connector as shown below.

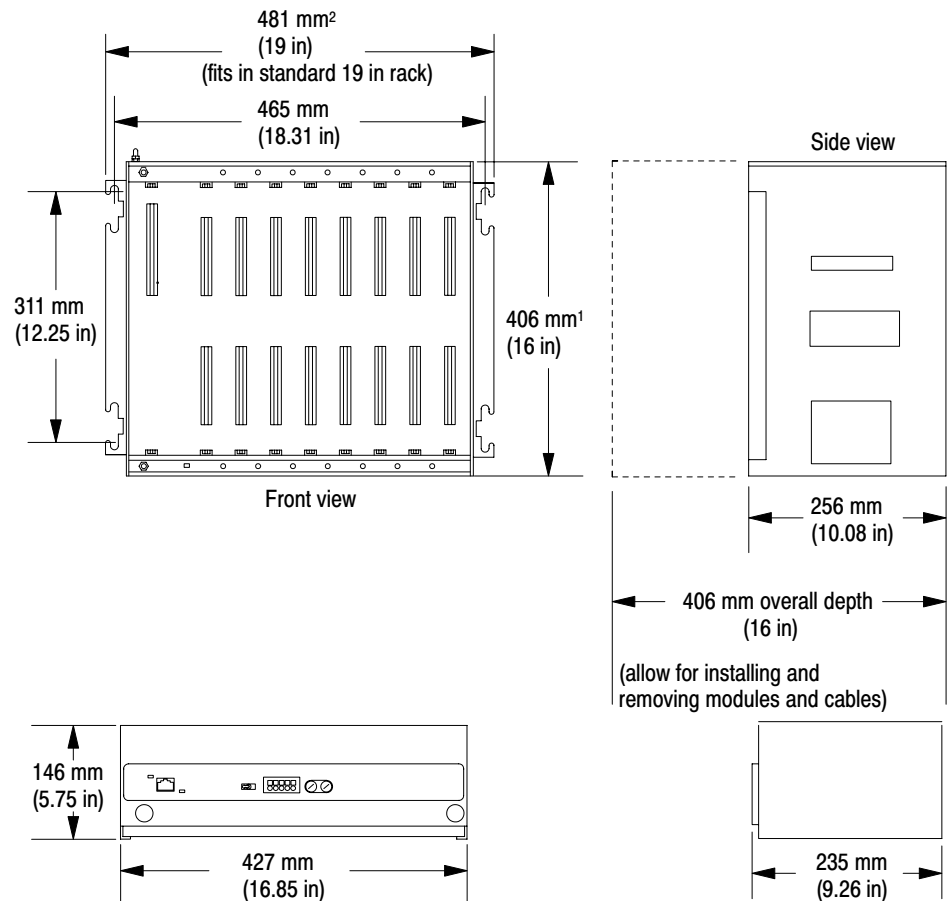


Mounting Dimensions

What's in this Appendix

This appendix contains the dimensions for PI products that you can mount.

Figure B.1
Dimensions: 8-Slot-Chassis (5110-A8/B) and Fan Assembly (5110-FAN8)



¹ Allow 6" above and below each chassis or each chassis and fan assembly

² If chassis is installed with other PI chassis, allow 6" between chassis. Otherwise, allow 4" left and right of the chassis.

³ If using program loader, position chassis within 6" of program loader so the data cable can be connected to the MicroVAX Information processor.

Figure B.2 Dimensions of the 4-Slot Chassis (5110-A4/B)

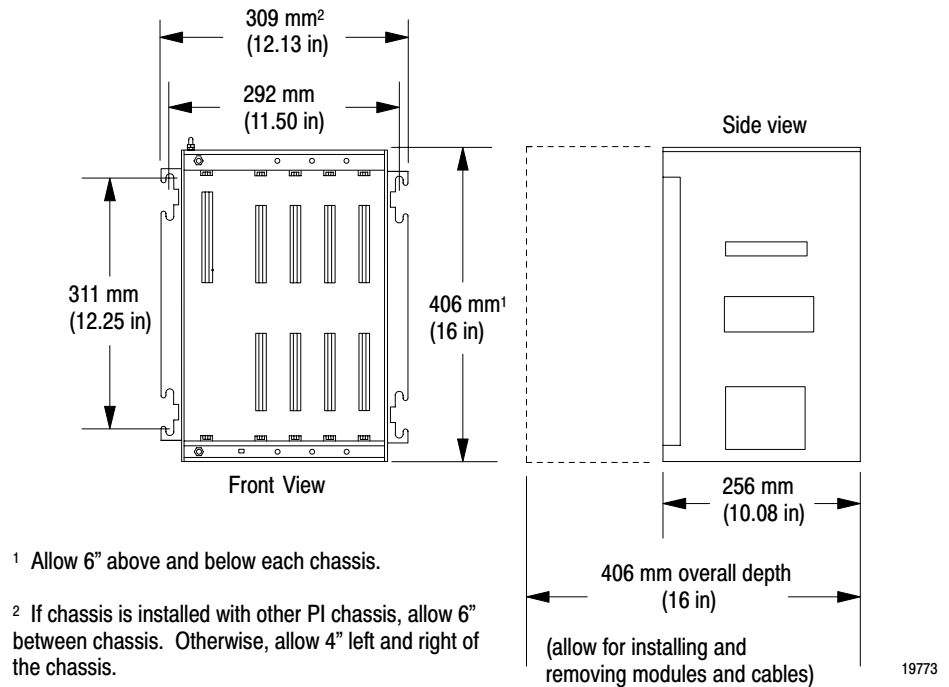


Figure B.3
Dimensions of the 4-Port Distribution Panel (5710-DPI)

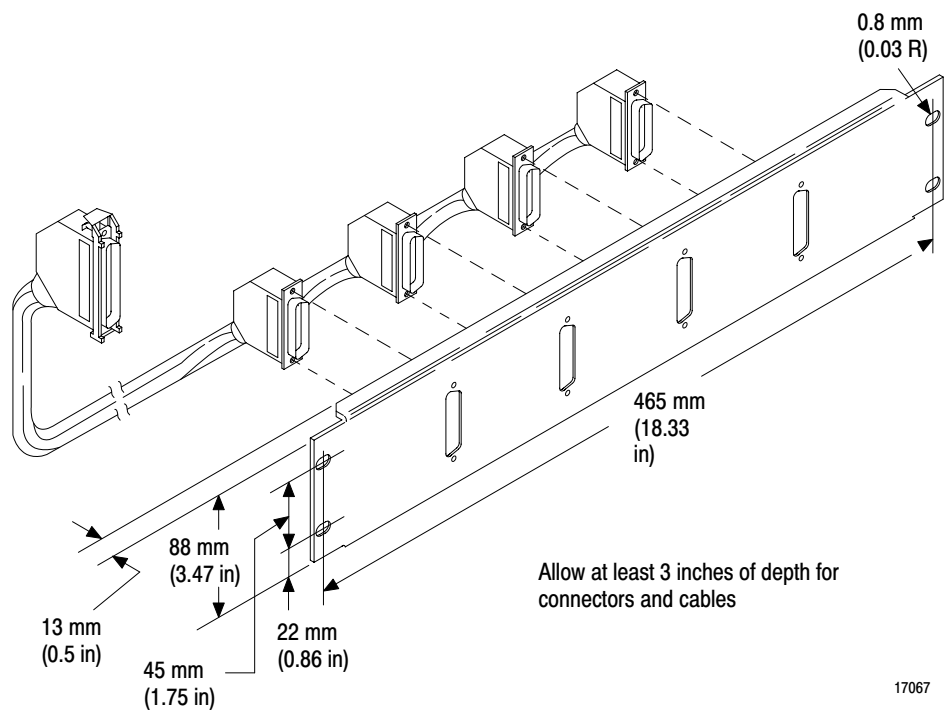


Figure B.4
Dimensions of the Industrial Disk (5710-ID4, -ID5, -ID6, -ID7 and 5730-ID3)

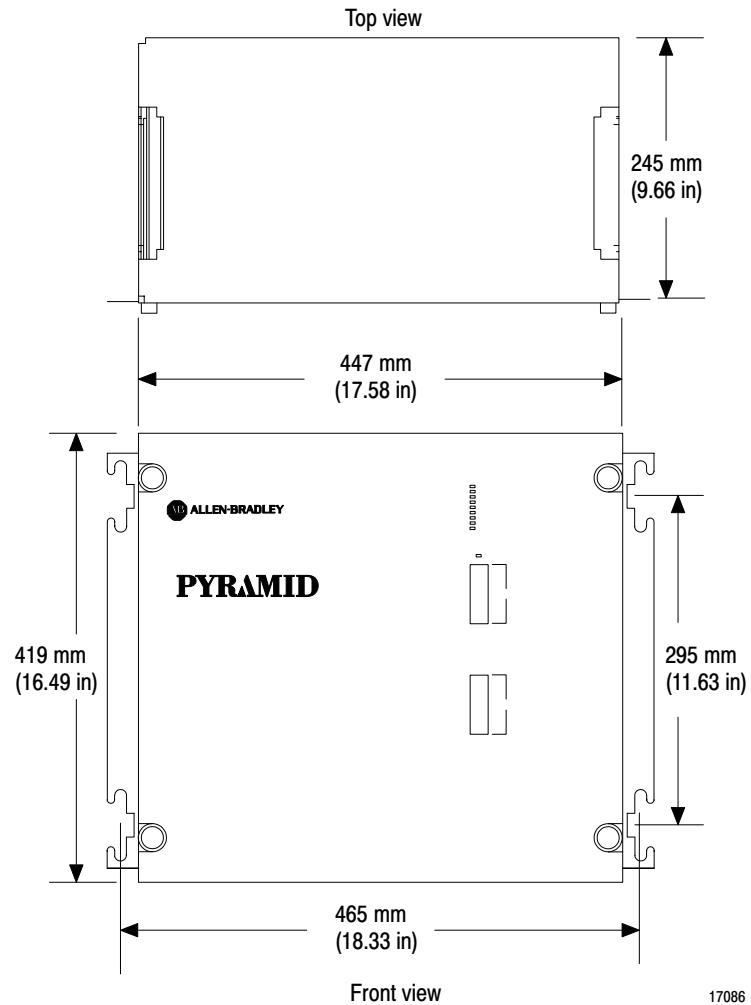


Figure B.5
Dimensions of the User Interface Box (2801-N22)

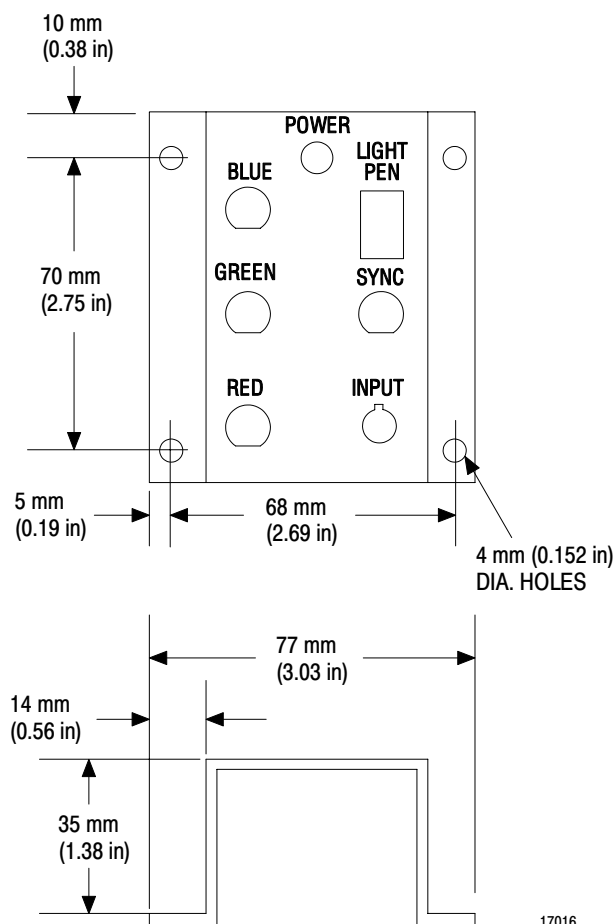
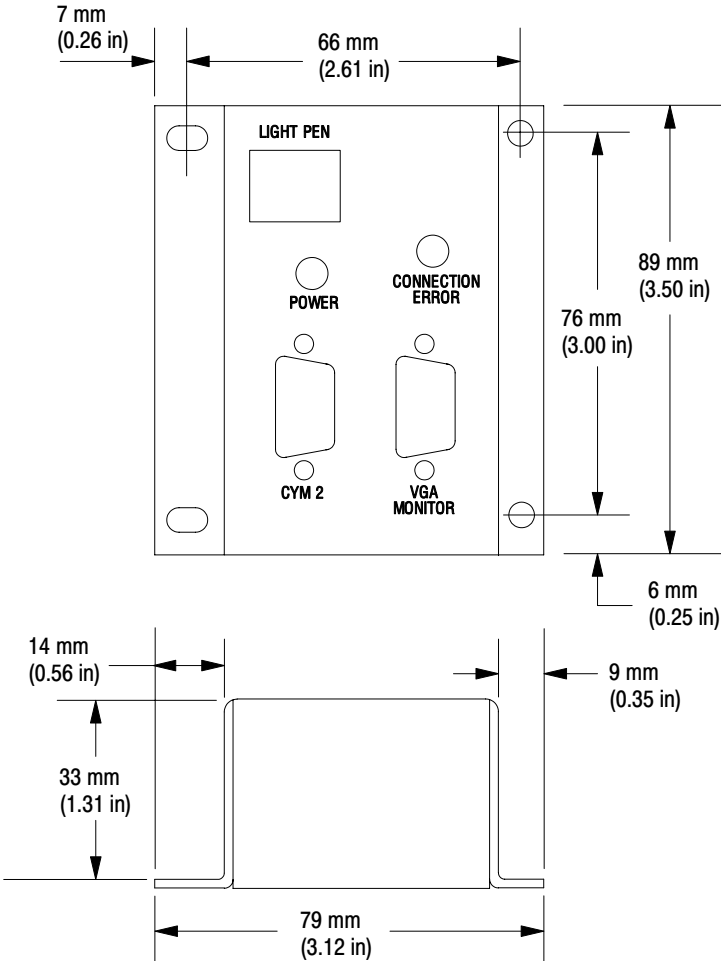
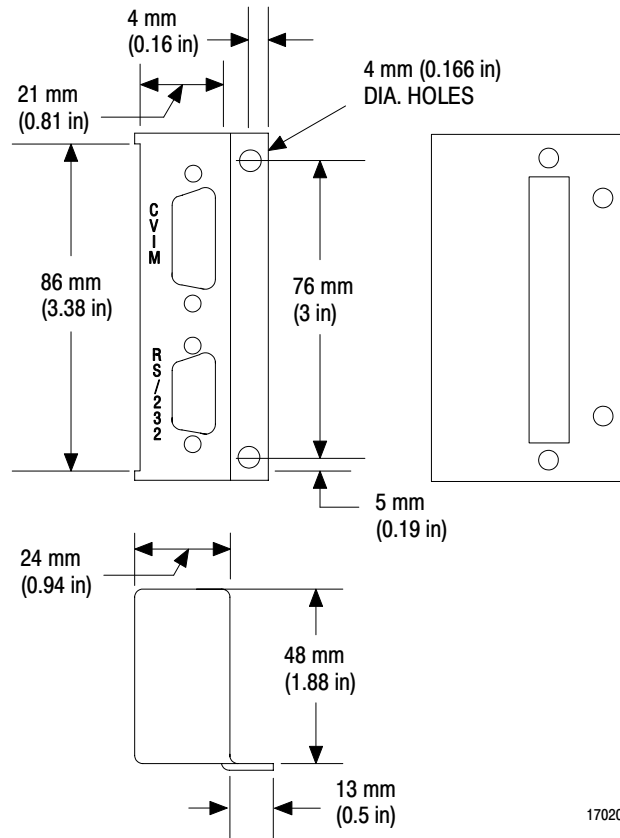


Figure B.6
Dimensions of the User Interface Box (2801-N26) -- for CVIM2 only



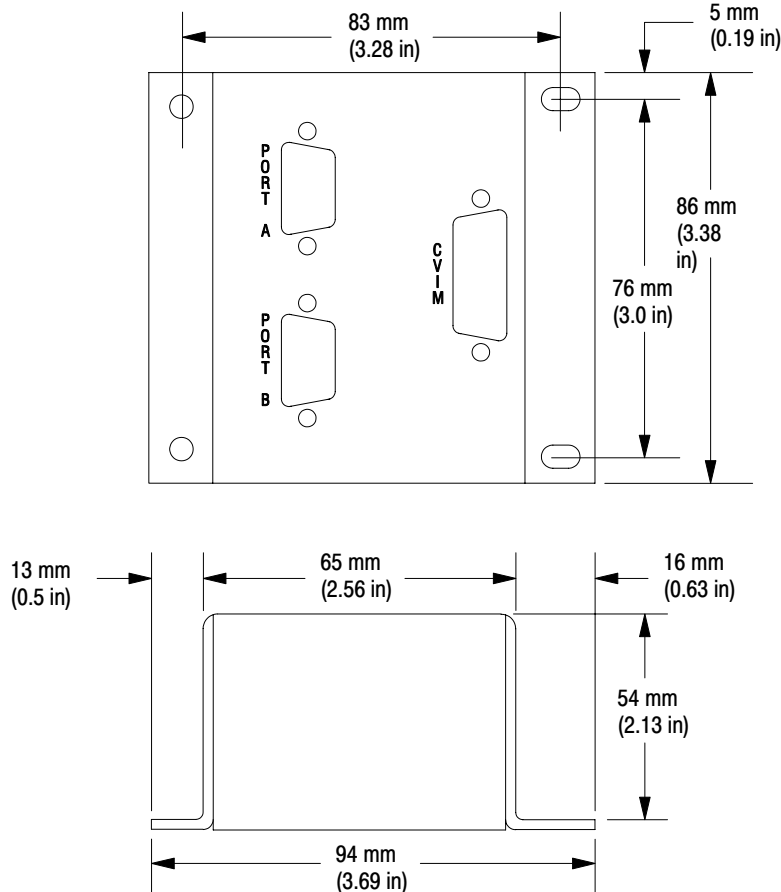
19902

Figure B.7
Dimensions of the I/O Interface Box (2801-N21)



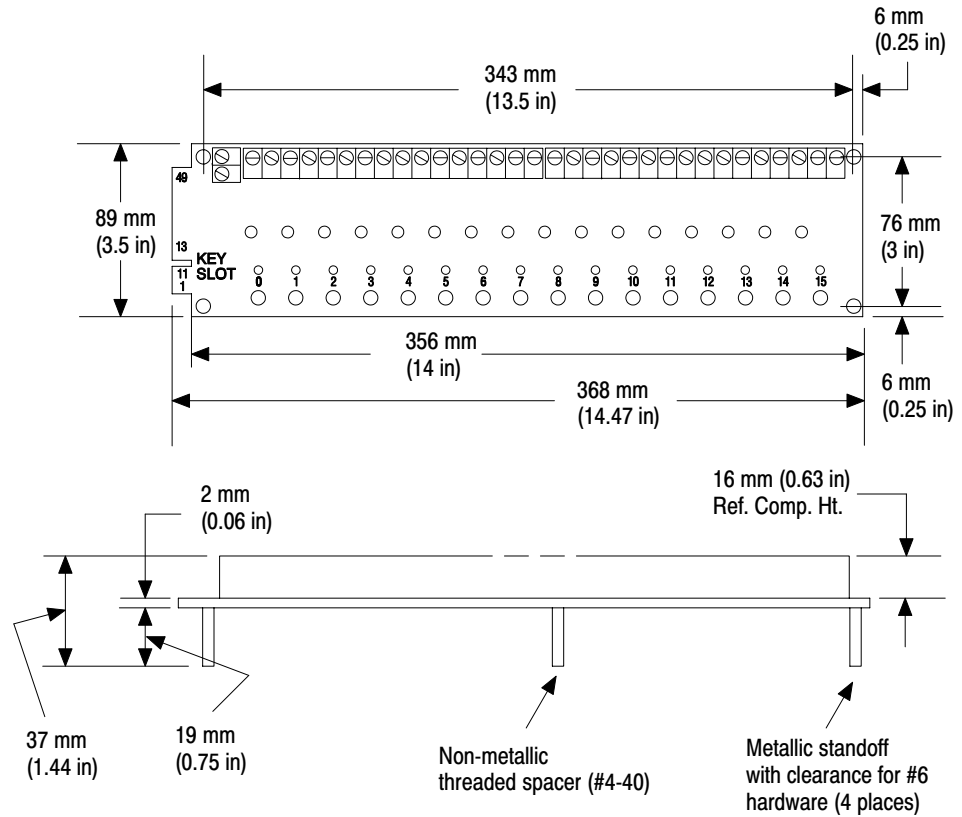
17020

Figure B.8
Dimensions of the I/O Interface Box (2801-N27)



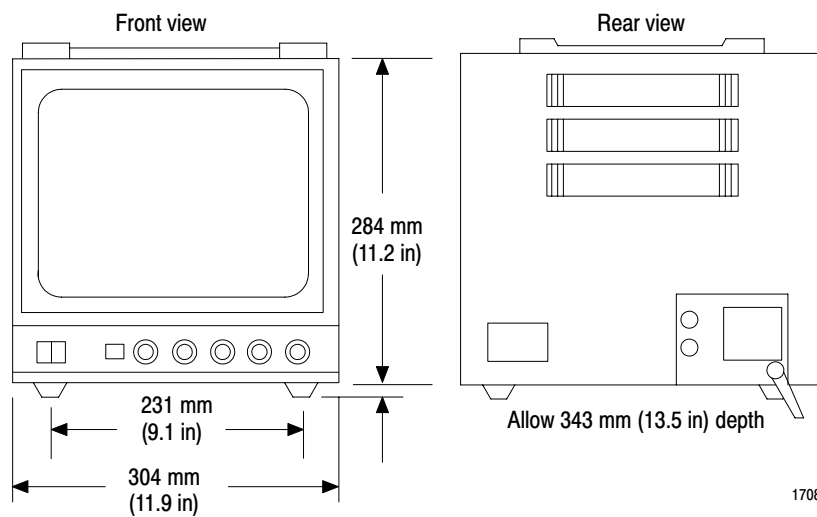
19903

Figure B.9
Dimensions of I/O Board (1771-JMB)



17092

Figure B.10
Dimensions of the 12" Black and White Monitor



17083

Figure B.11
Dimensions of 9" Black and White Monitor

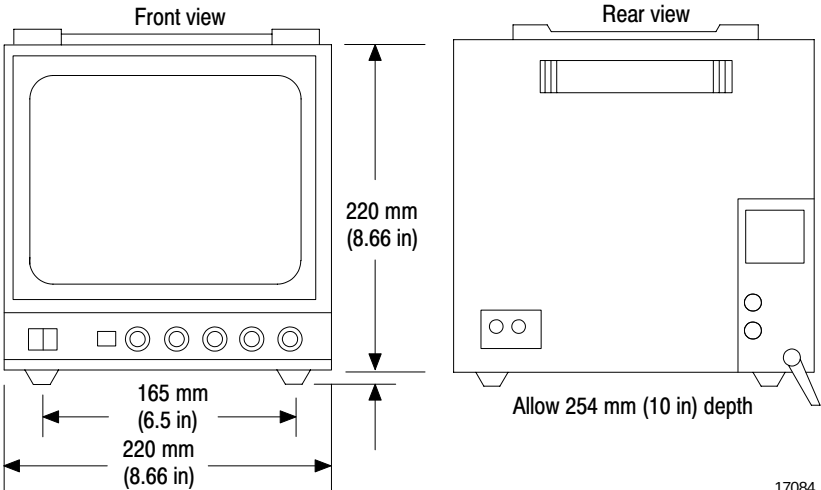
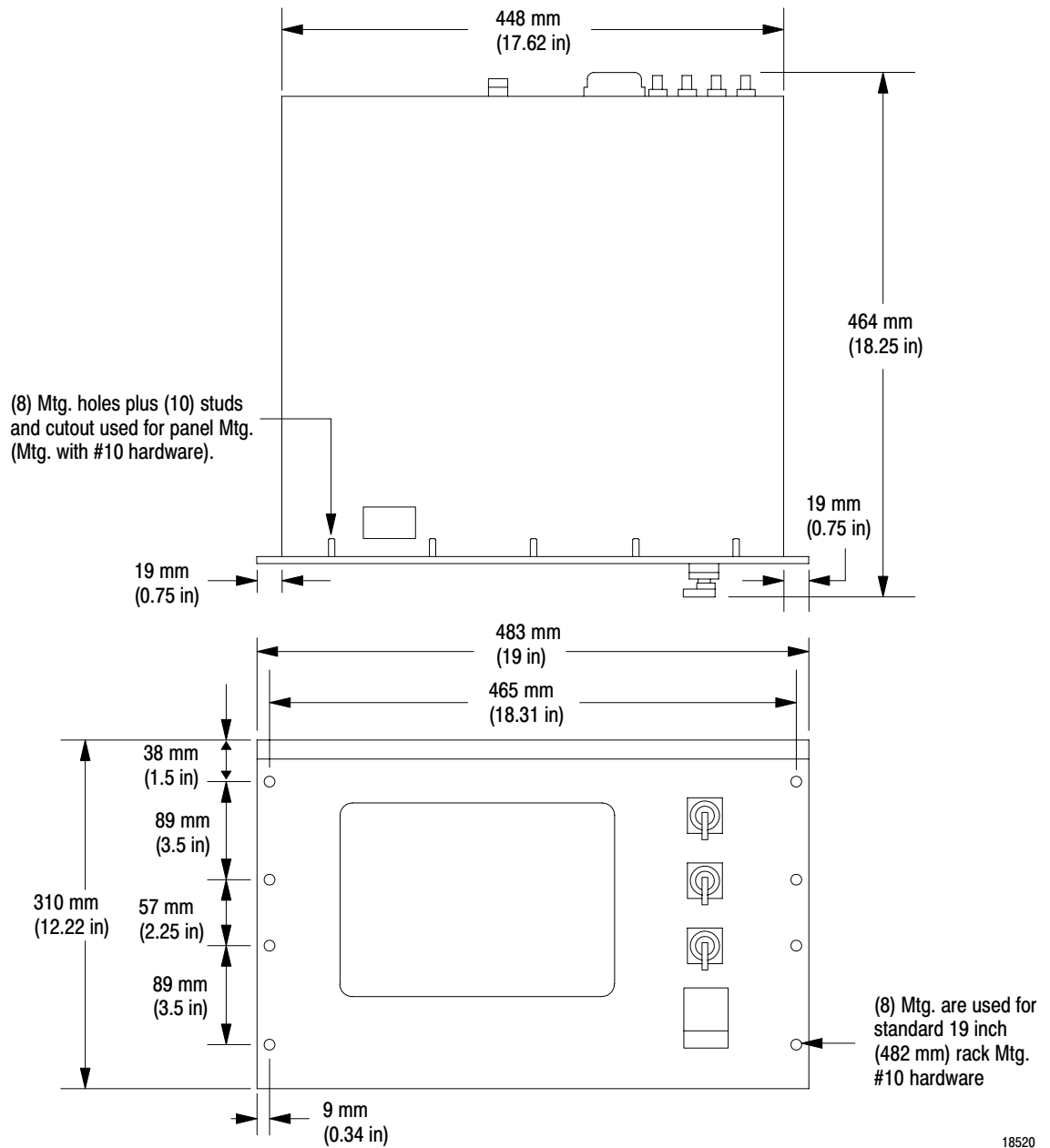
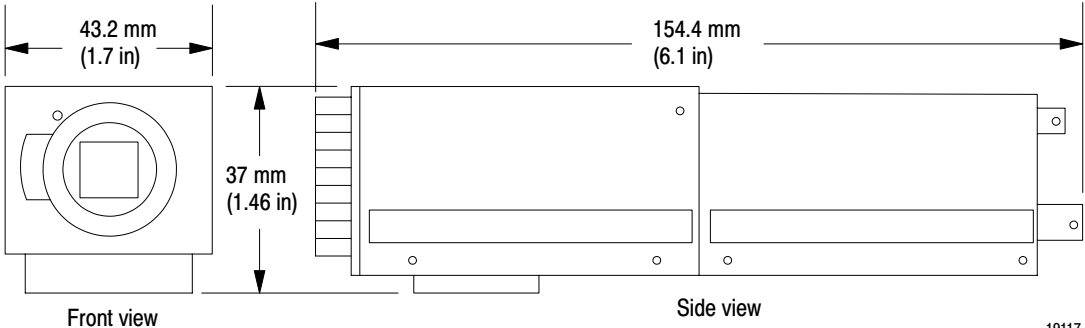


Figure B.12
Dimensions of the Rack Mount Color Monitor (2801-N8)



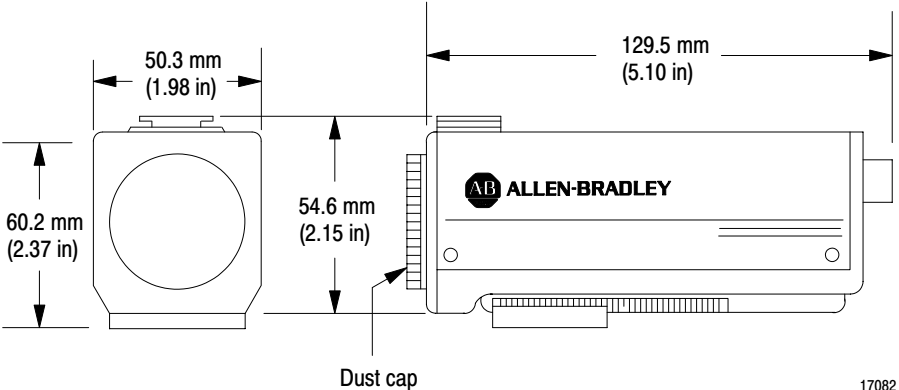
18520

Figure B.13
Dimensions of the Camera (2801-YB)



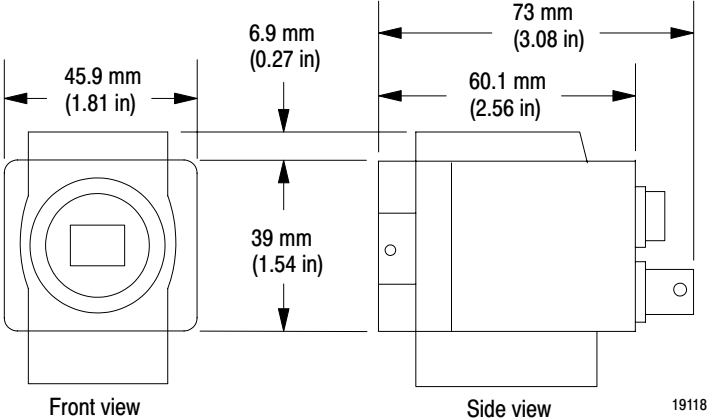
19117

Figure B.14
Dimensions of the Camera (2801-YC)



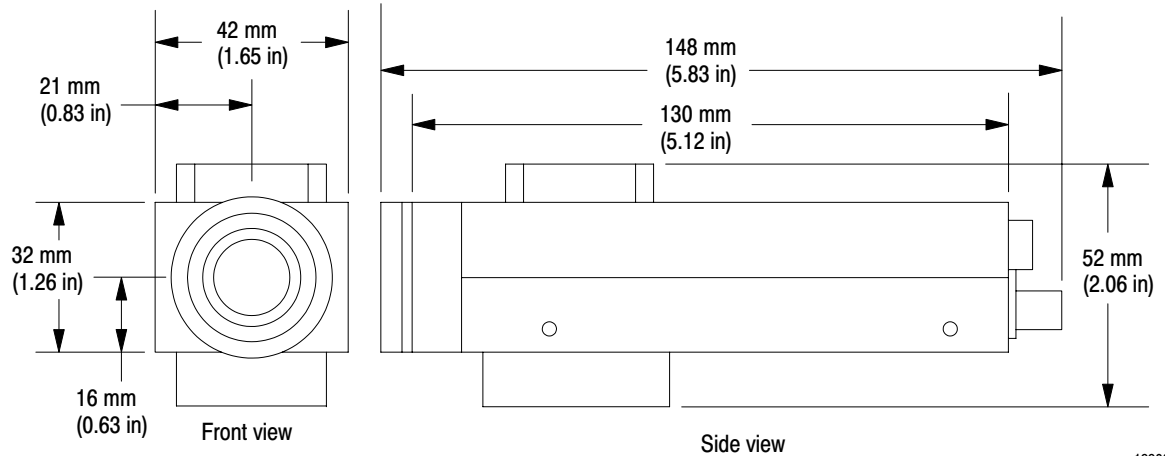
17082

Figure B.15
Dimensions of the Camera (2801-YD)



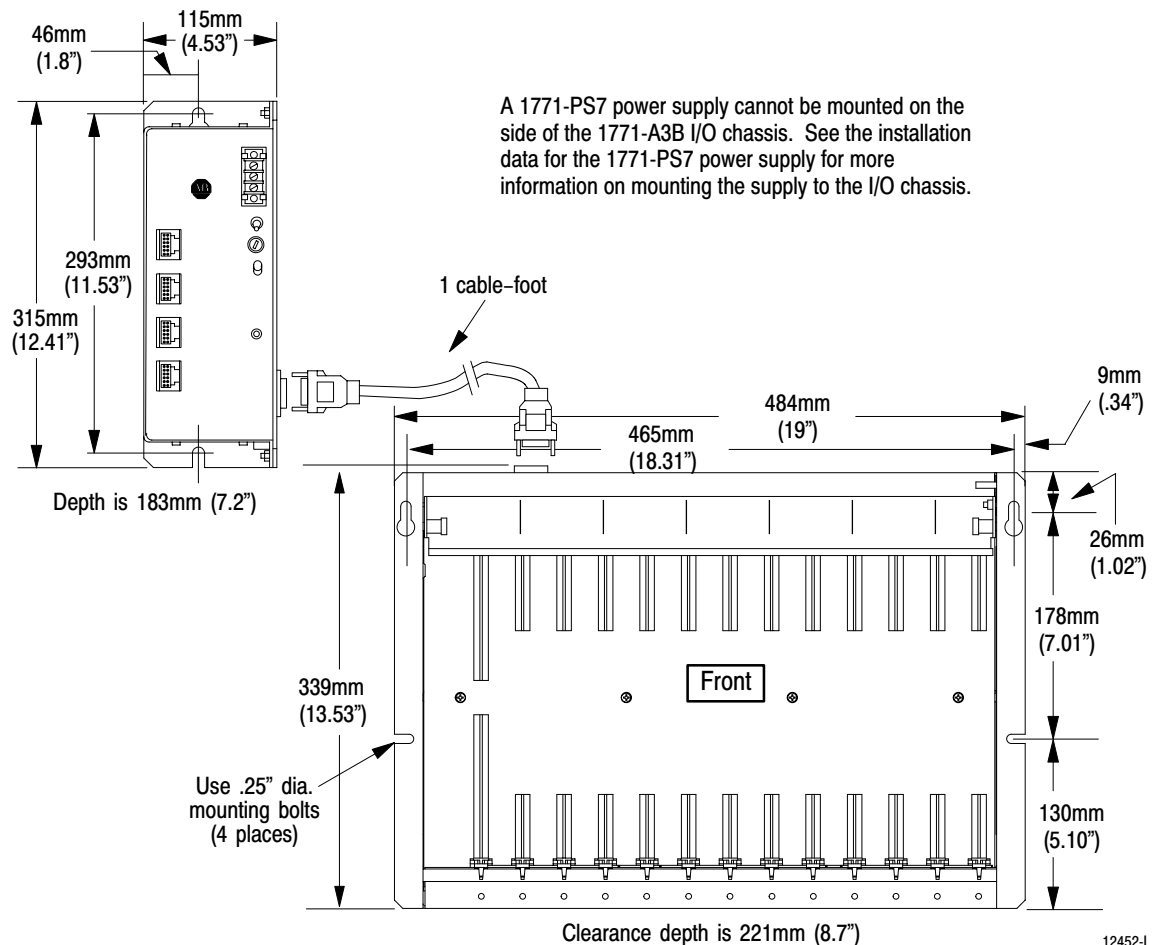
19118

Figure B.16
Dimensions of the Camera (2801-YE)



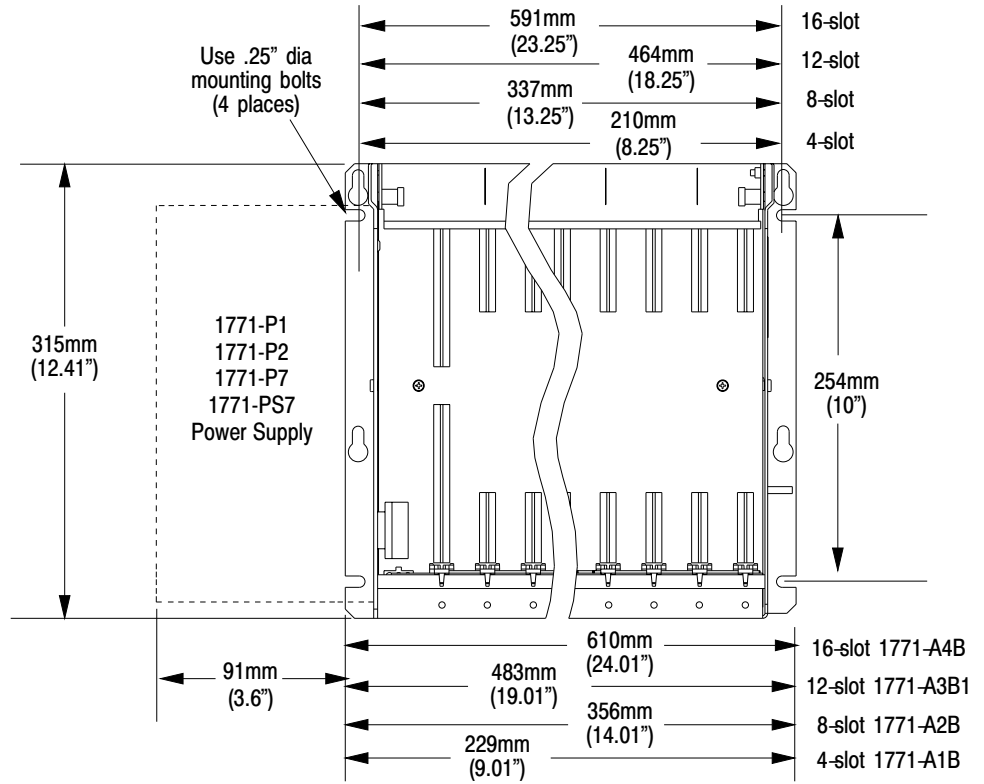
19900

Figure B.17
Mounting Dimensions of 1771-A3B1 12-Slot I/O Chassis with Power Supply



12452-1

Figure B.18
(Continued from **Figure B.17**) Mounting Dimensions of 1771-A3B 12-slot I/O Chassis with Power Supply



Clearance depth is 204mm (8 in) for 8 I/O connection points per module.

12451-1

Cable Connections for the RM and KA Module

What's in this Appendix

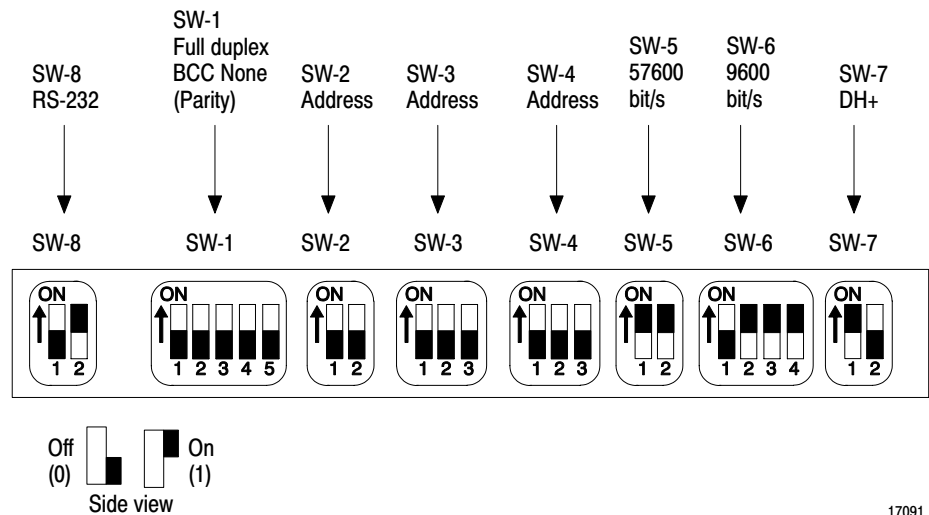
This appendix contains information on:

- example switch settings for 1770-KF2 and 1785-KE communication interface modules
- cable connection diagrams for ports 2A or 2B of the RM and KA module
- cable pinouts for serial communications
- cable diagrams for various Allen-Bradley cables

Switch Settings

Figure C.1 shows an example of how to configure the switch settings for a 1770-KF2 or a 1785-KE communication interface module.

Figure C.1
Example switch settings for 1770-KF2 or 1785-KE



17091

Switch:	Function:
SW-1	asynchronous link features
SW-2, SW-3, SW-4	station address
SW-5	DH baud rate
SW-6	asynchronous link baud rate
SW-7	DH+ network
SW-8	RS-232-C or RS-422 selection

For more information about the different possible switch settings, see the documentation for your communication interface module.

Cable Connections

The following diagrams show cable connections for communication via ports 2A and 2B of the resource manager and KA module.

Important: The maximum cable length for DH/DH+ is 10,000 ft using a 57.6k bit/s transmission rate and 5,000 ft using a 115.2k bit/s transmission rate.

9-Pin Serial Port

T53

T70

6121

IBM AT

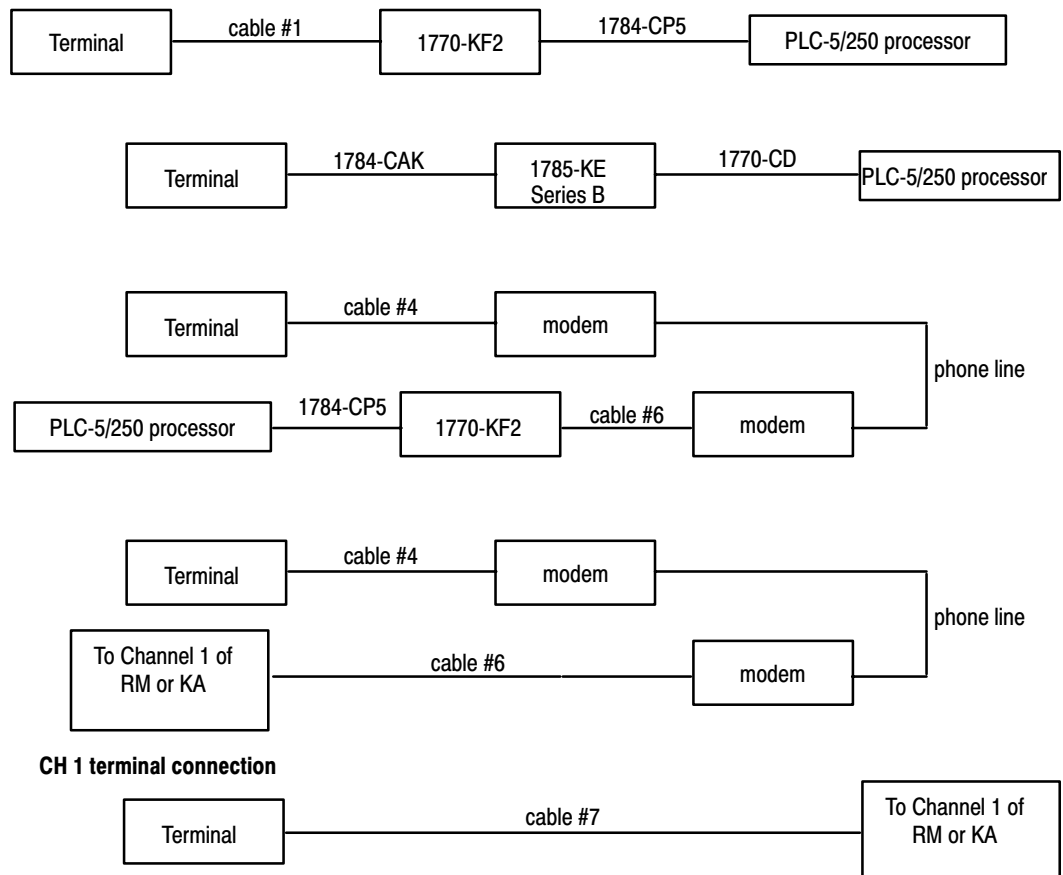
6160-T60

Compaq® Portable 2

Compaq Portable 286

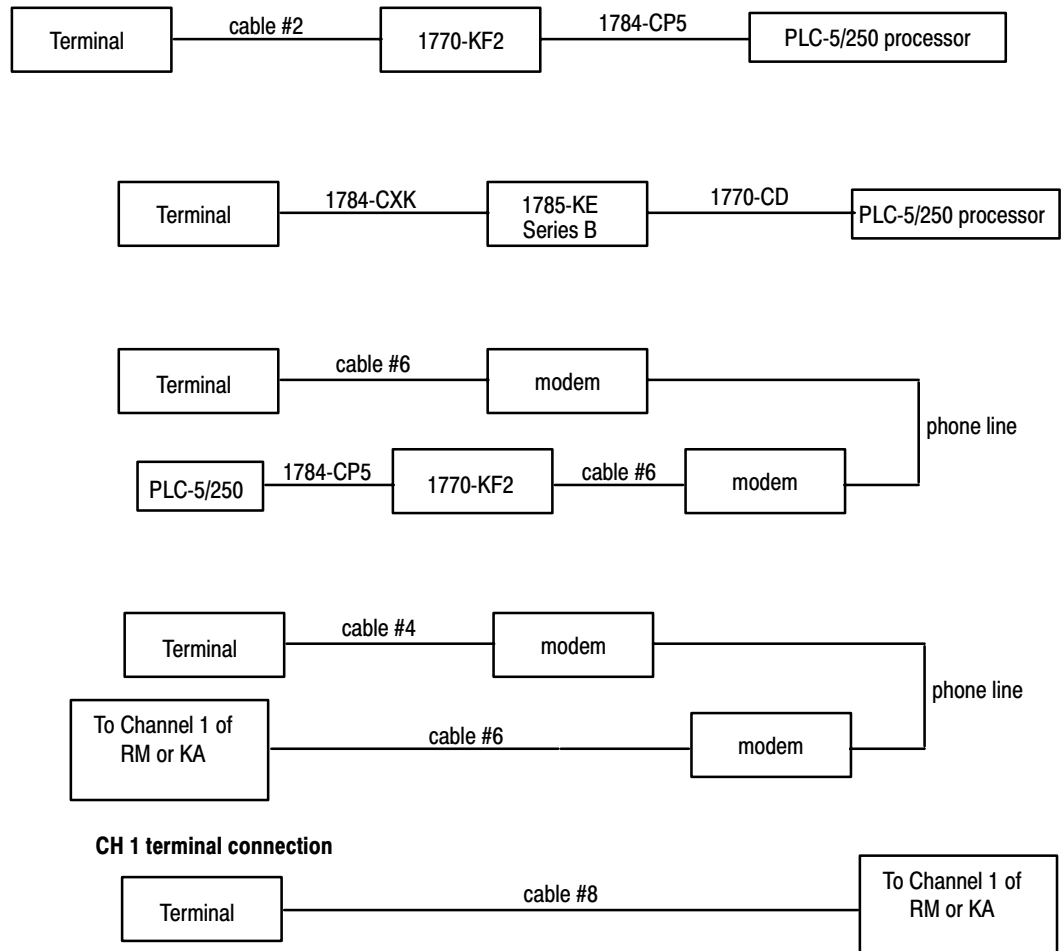
Compaq Deskpro 286

Compaq Deskpro 386



25-Pin Serial Port

T47
IBM XT
6123
6124
IBM PS/2™ Model 30
IBM PS/2 Model 60



Cable Pinouts

The following diagrams show the cable pinouts you can use for communications on the ports of the resource manager and the KA module.

Figure C.6 shows the cable pinouts for port 2A and 2B.

Figure C.2
CH 1 Terminal Connection

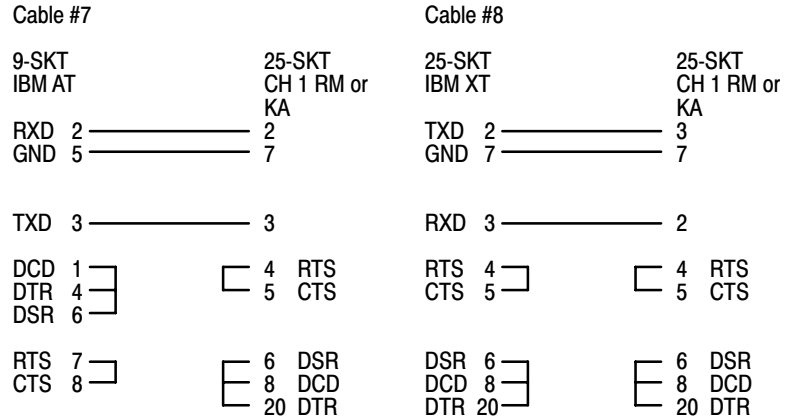
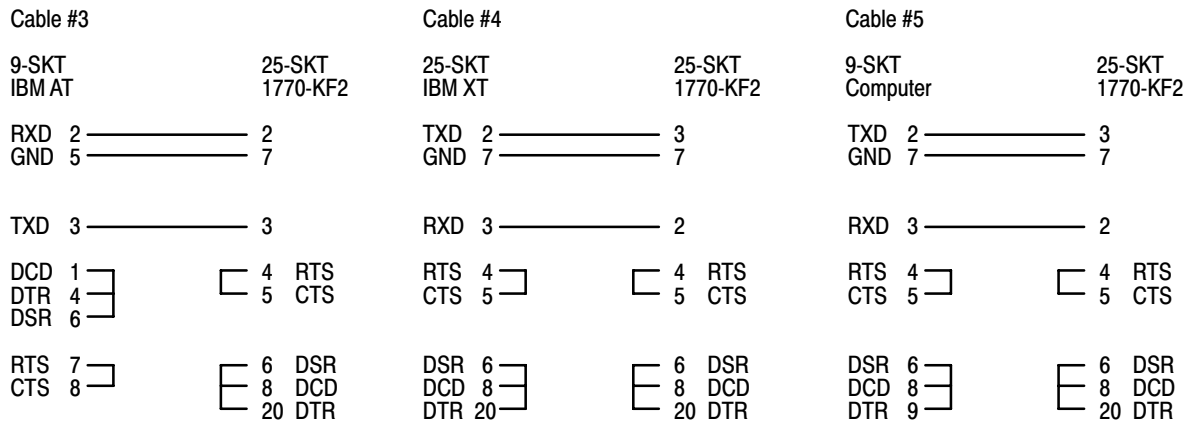


Figure C.3
Cable Pinouts Between a Computer and a Modem



Cable pinouts between a computer and a modem

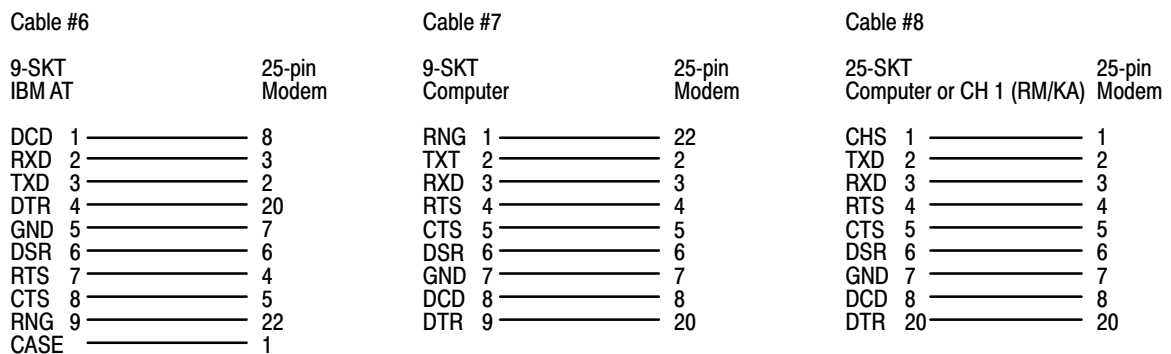
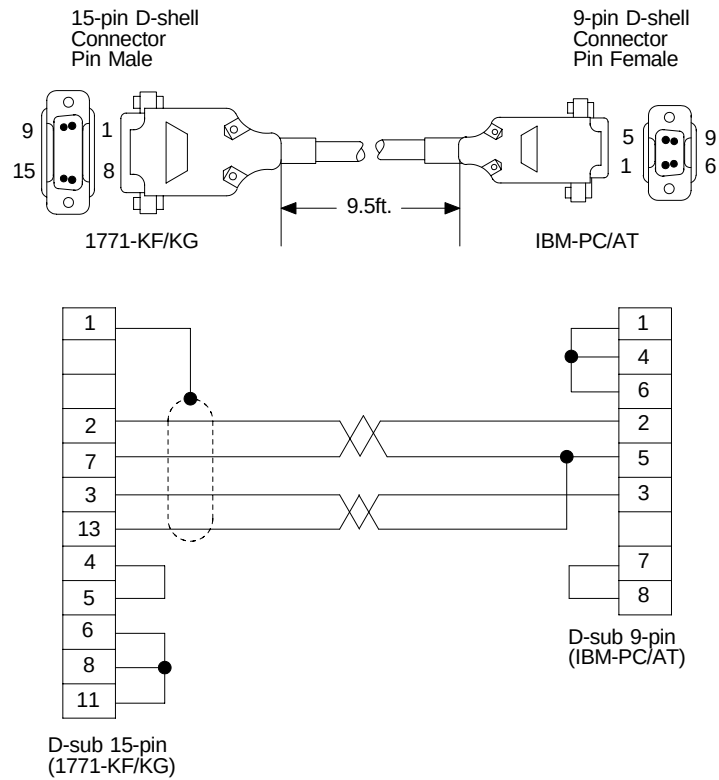
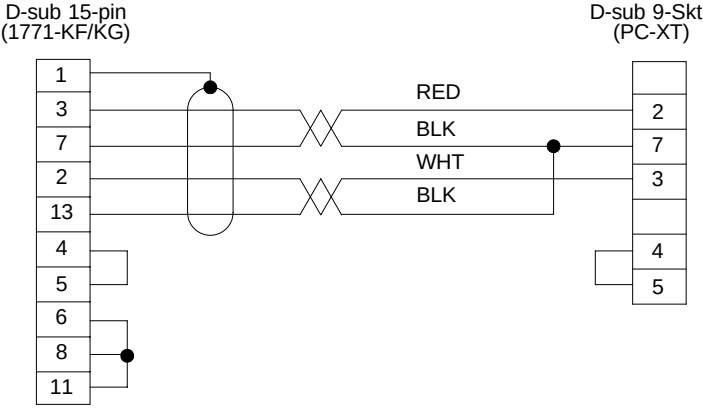
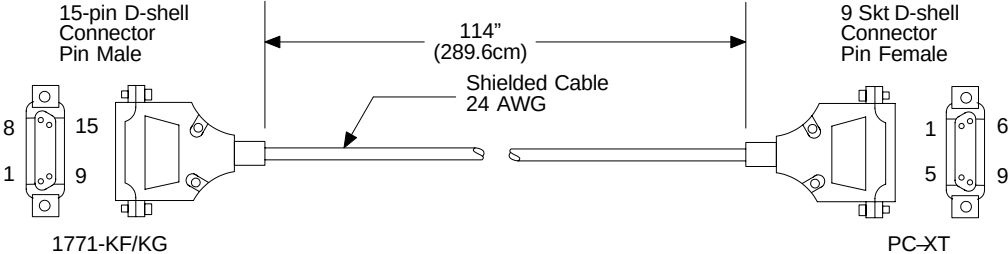


Figure C.4
Interconnect Cable (cat. no. 1784-CAK)
1771-KF/KG to IBM-PC/AT



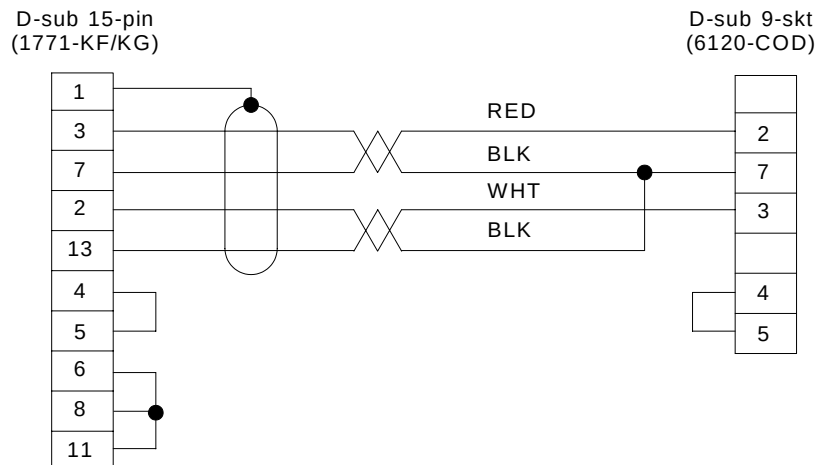
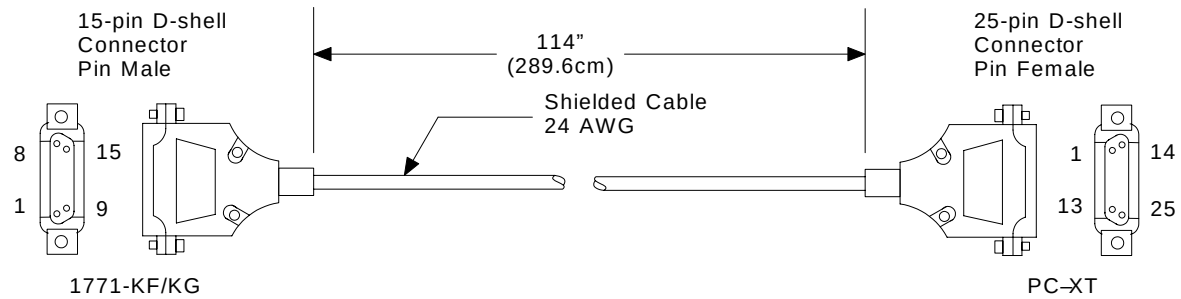
17088

Figure C.5
Interconnect Cable (cat. no. 1784-CYK)
1771-KF/KG to 6120-COA/COX, IBM-PC, XT



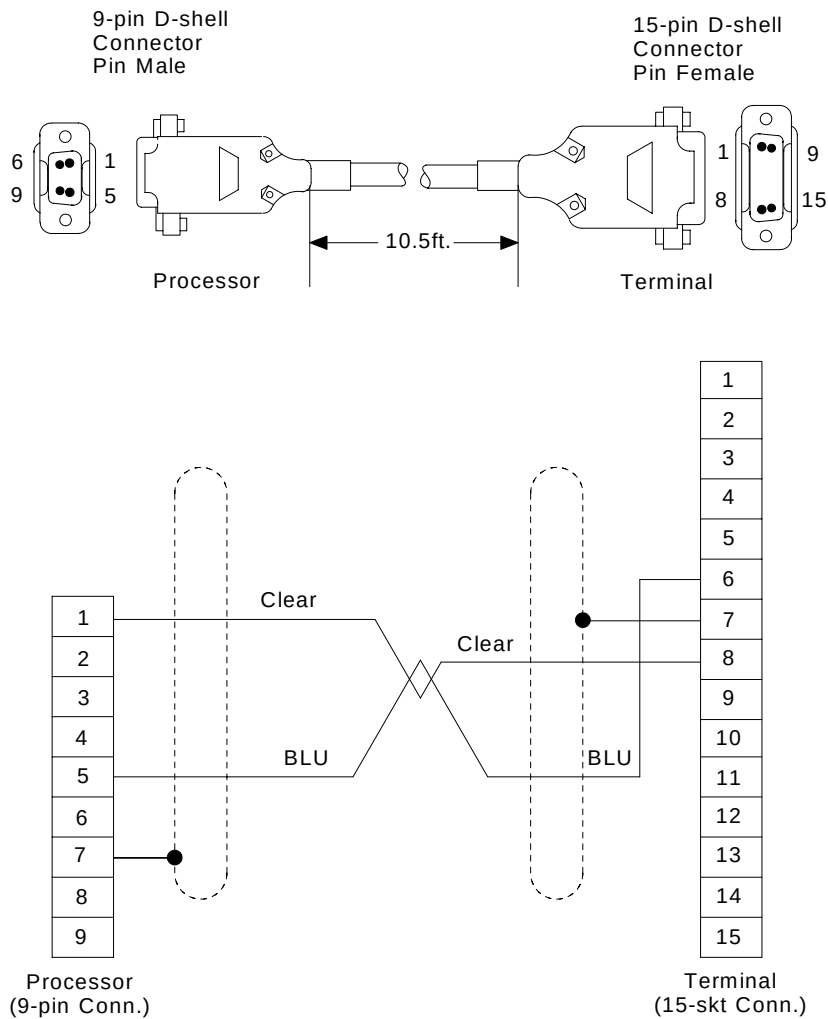
12727

Figure C.6
Interconnect Cable (cat. no. 1784-CXK)
I1771-KF/KG to IBM-PC/XT



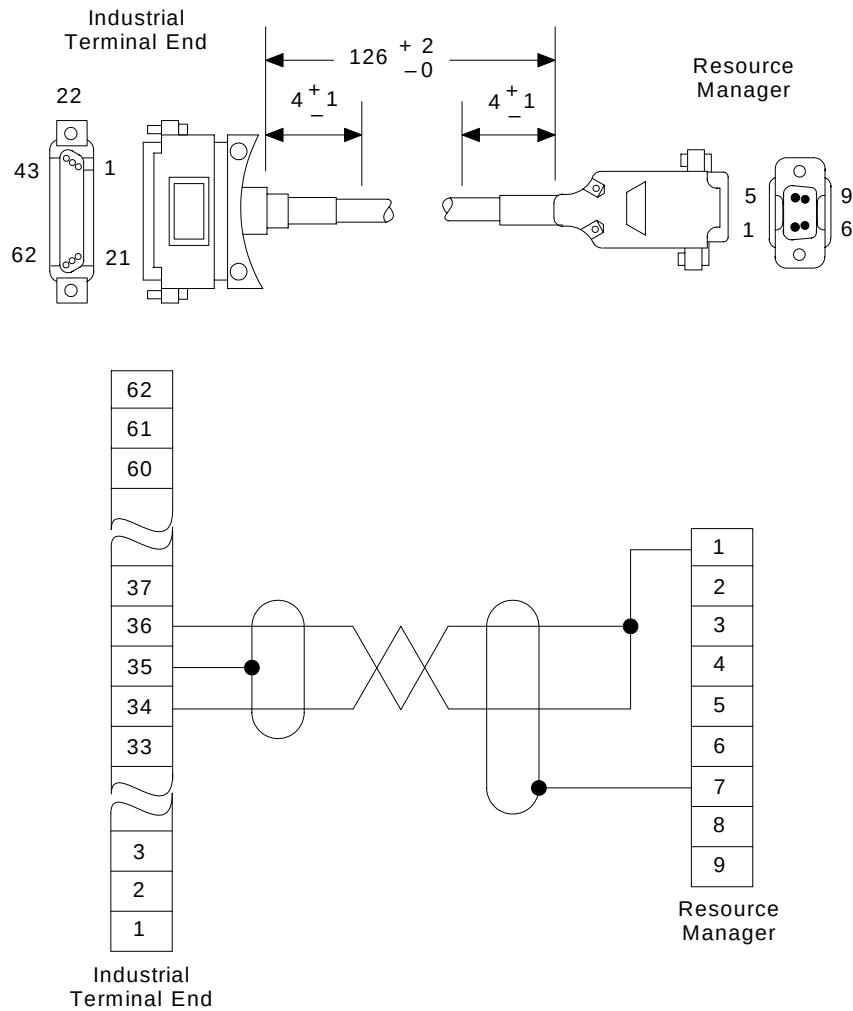
12726

Figure C.7
Interconnect Cable (cat. no. 1784-CP5)
Processor/Terminal Interconnect Cable



17089

Figure C.8
Interconnect Cable (cat. no. 1784-CP)
Processor/Terminal Interconnect Cable



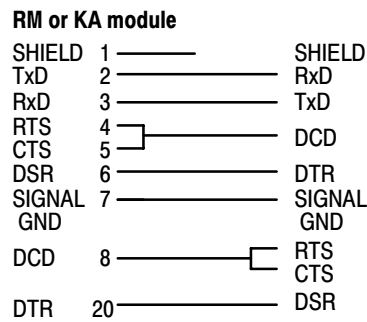
16860

Null Modem Cables

Figure C.9, Figure C.10, and Figure C.11 show null-modem cable pinouts for port 1.

Figure C.9
Null-Modem Cables for Full-Duplex Modem Option

Option 1 — uses DSR/DTR



Option 2 — bypasses DSR/DTR

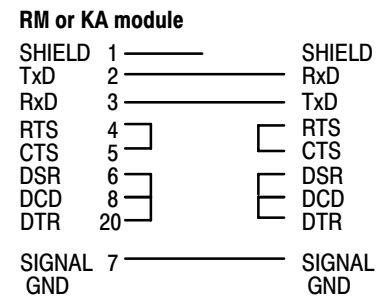
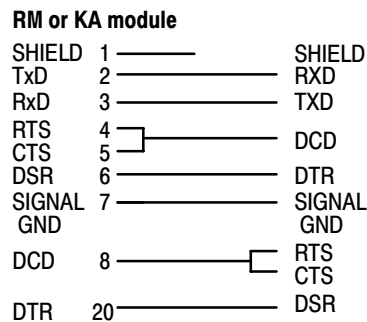


Figure C.10
Null-Modem Cables for Half-Duplex Modem Option

Option 1 — uses DSR/DTR



Option 2 — bypasses DSR/DTR

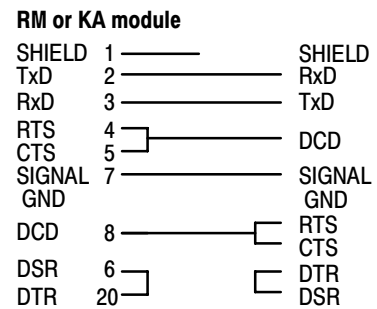
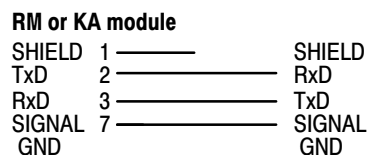


Figure C.11
Null-Modem Cables for No Handshaking



Start Up and Configure the Modules

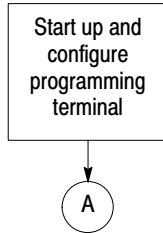
What's in this Appendix

This appendix provides flowcharts that outline the scope for starting up and configuring:

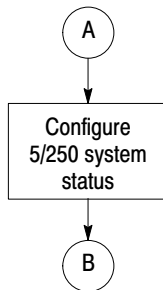
To start up:	See page:
programming terminal	D-2
PLC-5/250 system status	D-2
KA module	D-2
communication module status	D-2
RS status	D-3
LP status	D-4
MicroVAX hardware	D-5
MicroVAX software	D-6
Ethernet Interface software	D-7
OSI software	D-8

Following each flowchart is a reference to the appropriate documentation for detailed information.

Start Up and Configure Programming Terminal

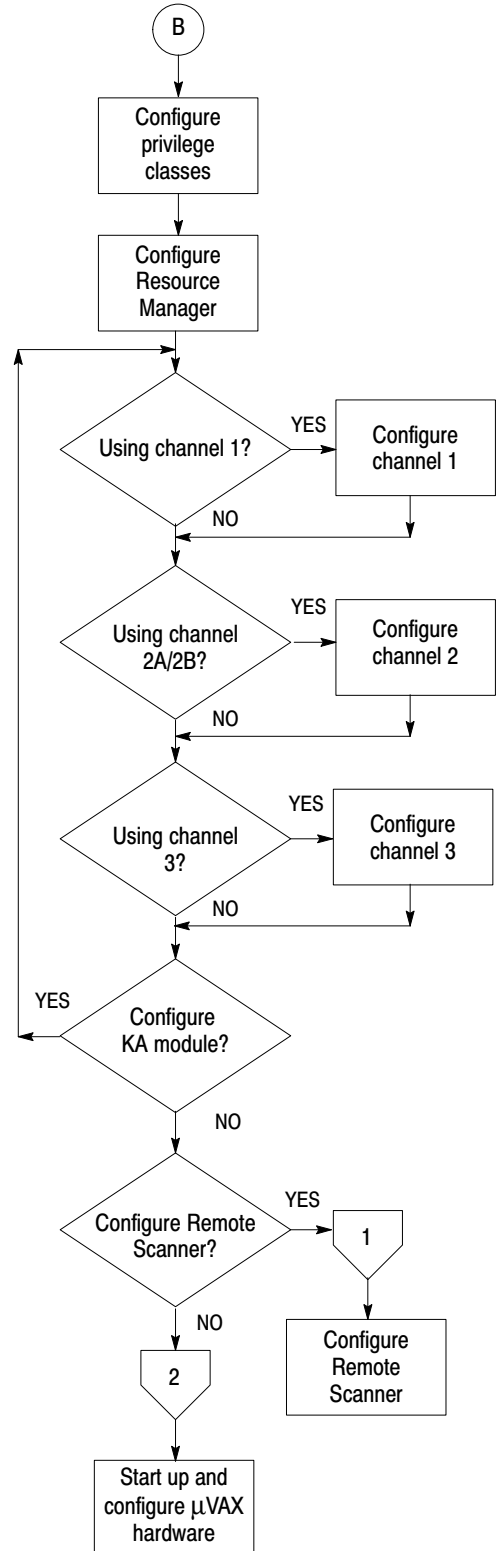


Configure 5/250 System Status

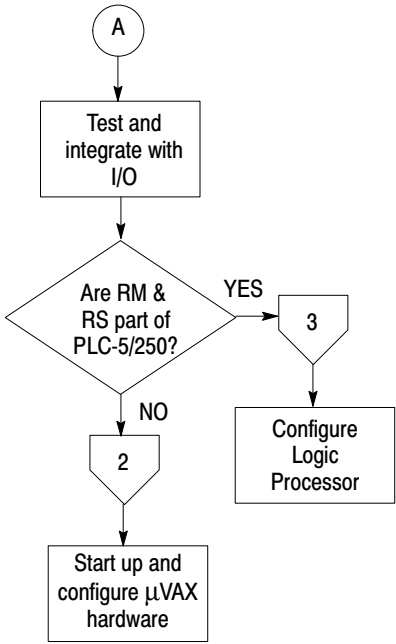
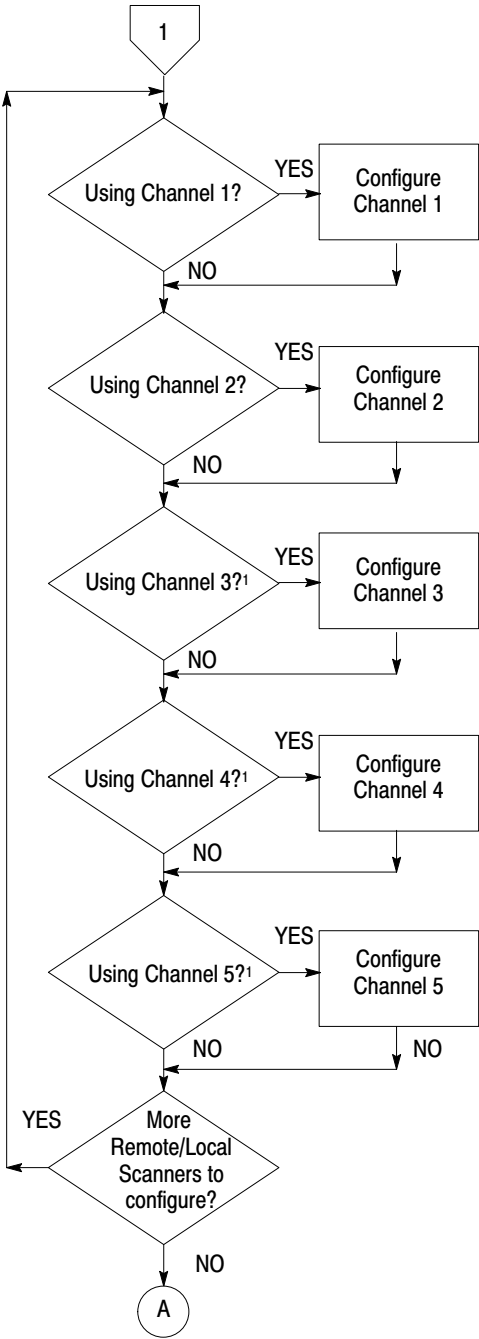


For more information, see *PLC-5/250 Programming Software Configuration and Maintenance* (5000-6.4.7).

Configure Communication Module Status



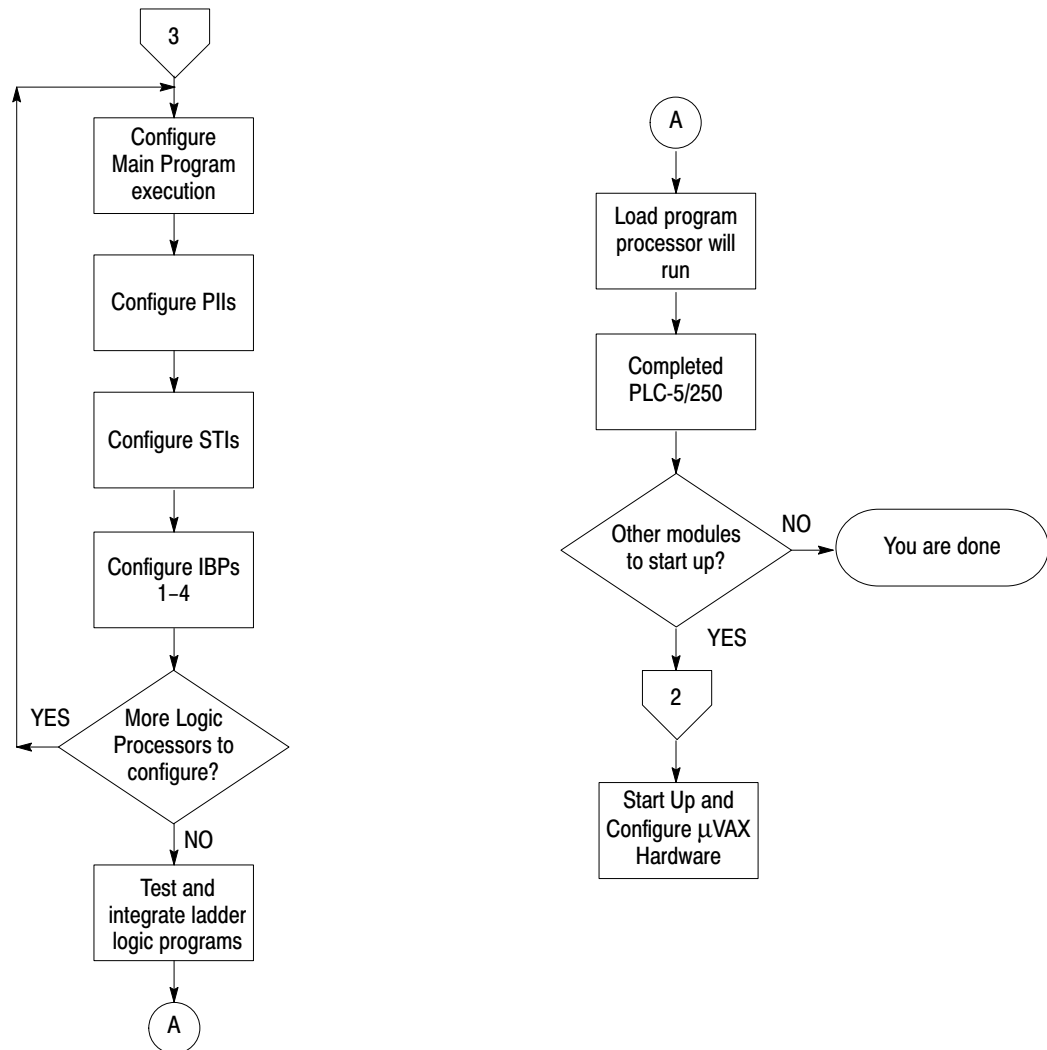
Start Up and Configure Remote/Local Scanner Module Status



¹ This applies to RS5 only.

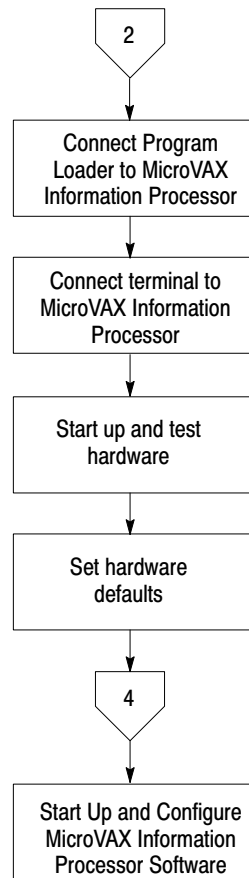
For more information, see *PLC-5/250 Programming Software Configuration and Maintenance* (5000-6.4.7).

Start Up and Configure Logic Processor Module Status



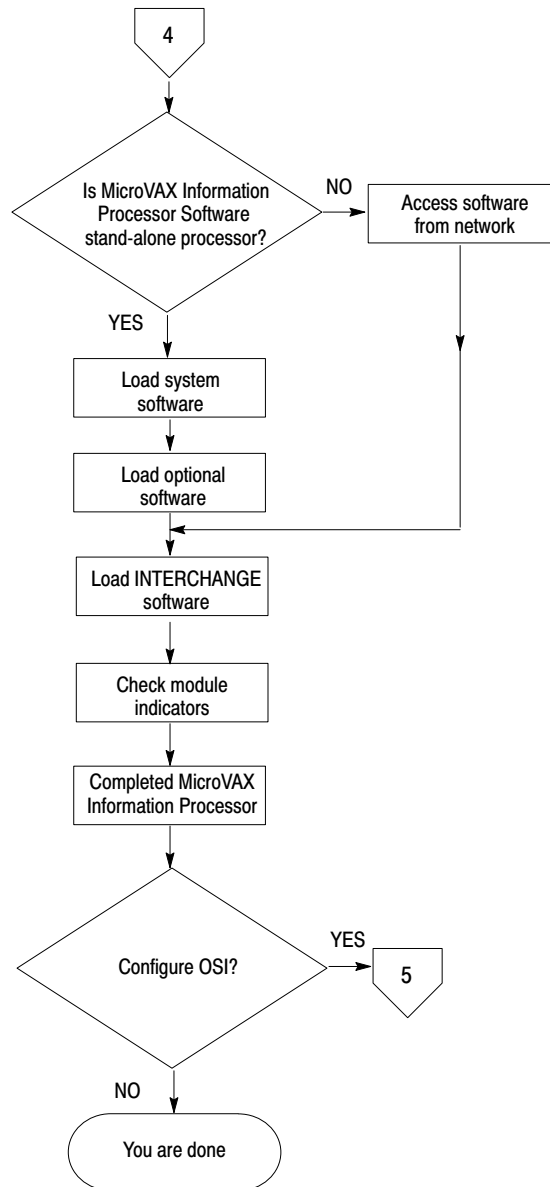
For more information, see *PLC-5/250 Programming Software Configuration and Maintenance* (5000-6.4.7).

Start Up & Configure MicroVAX Information Processor Hardware



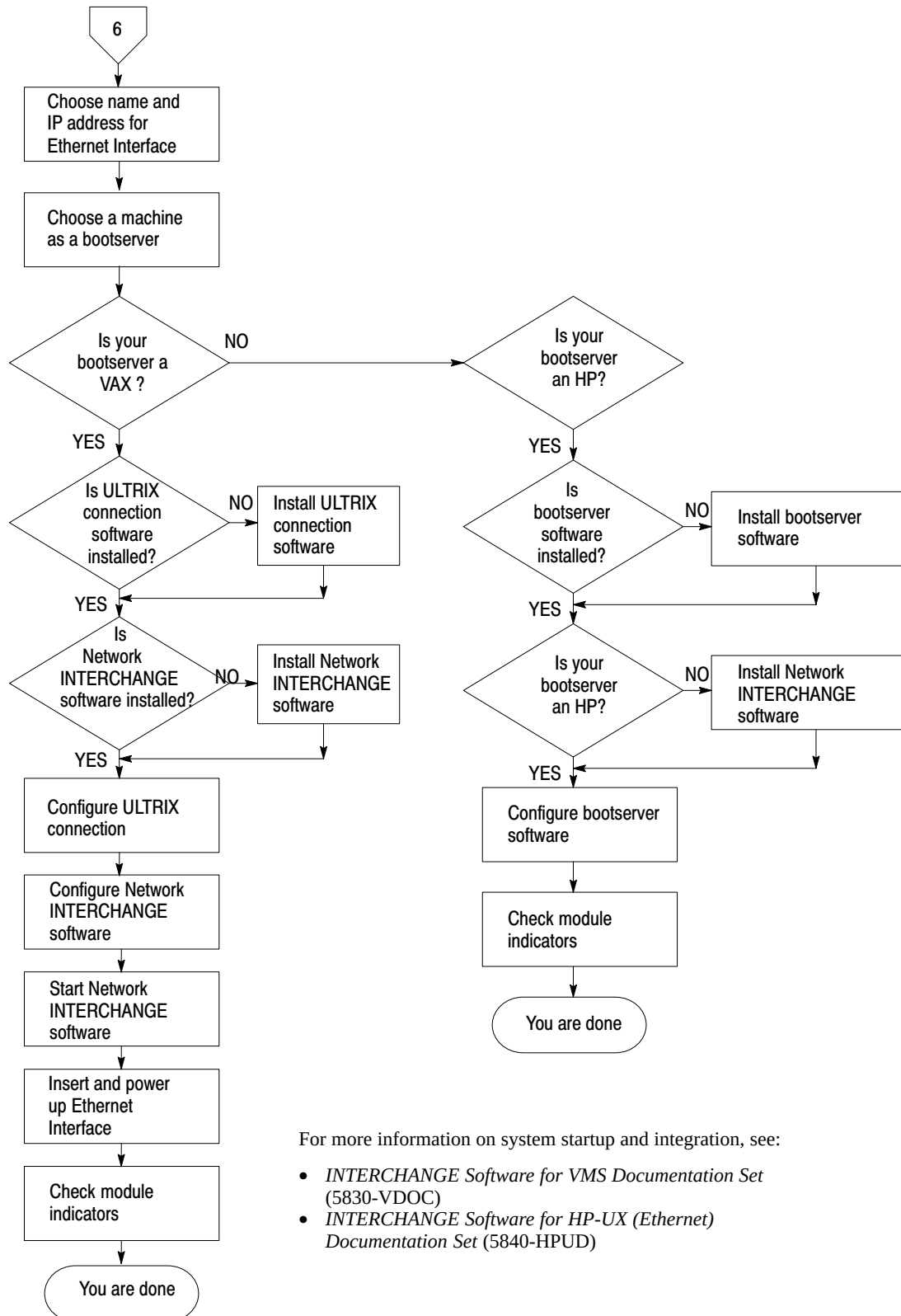
For more information, see *PI Data Table Library Installation and Configuration Manual* (5000-6.6.1).

Install MicroVAX Information Processor Software



For more information, see *PI Data Table Library Installation and Configuration Manual* (5000-6.6.1).

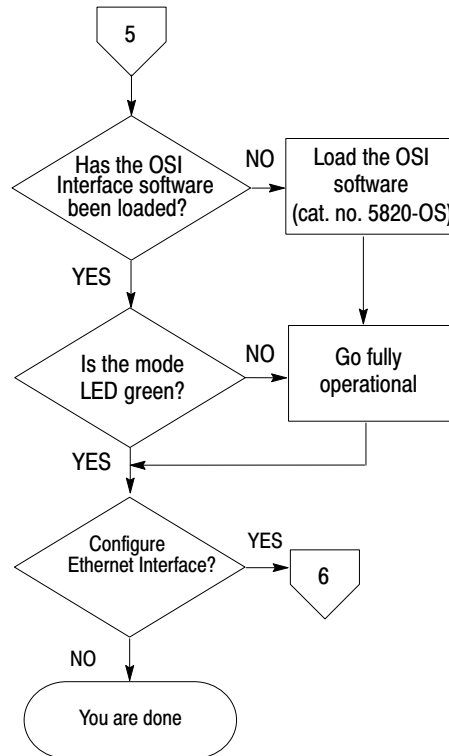
Install Ethernet Interface Software



For more information on system startup and integration, see:

- *INTERCHANGE Software for VMS Documentation Set (5830-VDOC)*
- *INTERCHANGE Software for HP-UX (Ethernet) Documentation Set (5840-HPUD)*

Start up OSI Software



18284-I

For more information, see *MAP Station Manager Software User Manual* (6630-6.5.2).

Numbers

1771-IX, [7-9](#)
1771-IY, [7-9](#)
4-port distribution panel, [1-9](#)
 connection
 MicroVAX Information Processor, [5-9](#)
 other devices, [5-9](#)
 dimensions, [B-2](#)
 pin-outs, [5-9](#)
802.4 token-passing network, [1-7](#)

A

A-B MAP Station Manager. See MAP Station Manager, [4-28](#)

ac
 power, [10-3](#)
 power connection, [10-1](#)
 fan assembly, [10-4](#)
 industrial disk, [10-3](#)
 power supply, [10-3](#)
adapter, module, switches, [7-3](#), [7-10](#)
adapter configuration
 extended-local I/O, [7-7](#)
 setting configuration plug, [7-9](#)
attentions, [4-26](#), [7-16](#), [7-19](#)
 ac selector switch, [10-3](#)
 air flow, [A-10](#)
 connecting ac power, [10-2](#), [11-1](#)
 discontinuity in the link, [9-8](#)
 earth grounds, [3-4](#)
 electrostatic discharge, [1-2](#)
 filler plates, [4-5](#)
 grounding, [10-1](#)
 lithium battery, [4-2](#)
 fire extinguisher, [4-4](#)
 performing internal operations, [A-1](#)
 powering down MicroVAX Information Processor, [12-3](#)
 setting switches, chassis, [7-2](#)

B

backplane, setting chassis configuration jumper, [7-3](#)
battery
 disposal of, [4-2](#)
 emergencies, [4-3](#)
 fire, [4-4](#)
 leaking, [4-4](#)

lithium, exposed, [4-4](#)
overheated battery, [4-3](#)
personnel protection, [4-3](#)
storing, [4-3](#)

Belden 9463, [6-7](#)
black and white monitor
 connection, user interface box, [6-4](#)
 dimensions, [B-8](#), [B-9](#)
booting, hardware, [12-3](#)
broadband, [4-32](#)
 cabling specifications, [4-30](#)
 setting switches, [4-26](#)

C

cable
 See also I/O link
 Belden 9463, [6-7](#)
 connecting the fan assembly, [4-6](#)
 connections, [C-3](#)
 daisy-chain configuration, [9-1](#)
 DH/DH+ length, [C-3](#)
 interconnect cable, [C-6](#), [C-7](#), [C-8](#), [C-9](#), [C-10](#)
 length, [9-1](#)
 null-modem, pinouts, [C-11](#)
 pinouts, [C-4](#)
 trunkline/dropline configuration, [9-1](#)
Cables, extended-local I/O, [9-5](#)
camera
 connection, CVIM module, [6-5](#)
 dimensions, [B-11](#)
carrierband
 cabling specifications, [4-30](#)
 connecting the module, [4-28](#), [4-30](#)
 setting switches, [4-26](#)
catalog numbers, [iv](#), [1-4](#), [1-5](#), [1-6](#), [1-7](#), [4-4](#)
change modes and boot MicroVAX Information Processor, [12-3](#)
 boot mode, [12-3](#)
 console mode, [12-3](#)
 run mode, [12-3](#)
chassis, [1-3](#)
 configuration jumper, [7-3](#)
 dimensions, [B-1](#)
 mounting, [2-2](#)
 mounting dimensions, [B-12](#), [B-13](#)
 setting switches, [7-2](#)
checking the hardware, [11-1](#)

Color CVIM module, illustration, [1-5](#)
color monitor
 connection, user interface box, [6-4](#)
 dimensions, [B-10](#)
communication
 interface module, [C-2](#)
 pinouts, [C-4](#)
conductors, grounding, [3-2](#)
Configurable Vision Input Module. See
 CVIM module, [v](#)
configuring
 direct communication module, [8-1](#)
 MicroVAX Information Processor, [12-1](#)
 OSI interface module, [4-31](#)
 PLC interface module, [8-3](#)
Connecting, remote I/O link, [9-1](#)
connecting
 ac power, [10-1](#)
 black and white monitor, [6-4](#)
 camera, [6-5](#)
 carrierband, [4-30](#)
 color monitor, [6-4](#)
 device with an OSI interface module,
 [4-30](#)
 fan assembly, [4-6](#)
 I/O, [4-17](#)
 I/O board, [6-6](#)
 I/O interface box, [6-2](#)
 I/O link, [9-1](#)
 industrial terminal, [4-12](#)
 light pen, [6-5](#)
 PIIs, [4-19](#)
 power interlock relay, [10-2](#)
 program loader, [5-9](#), [12-2](#)
 remote I/O link, [6-7](#)
 RS-232 device, OSI interface module,
 [4-28](#)
 RS-232, RS-422, RS-423, [4-12](#)
 user interface box, [6-3](#)
conventions, [v](#)
 switches, [8-1](#)
CVIM module, [v](#)
 check LEDs, [11-5](#)
 checking components, [11-8](#)
 completing installation of components,
 [6-1](#)
 connection
 camera, [6-5](#)
 remote I/O Link, [6-7](#)
 I/O interface box, [6-2](#)
 illustration, [1-5](#)
 installation, [4-20](#)
 module address, [4-21](#)
 mounting the camera, [2-10](#)
 switch for camera power, [4-20](#)

 user interface box, [6-3](#)
CVIM2 module, illustration, [1-5](#)

D

daisy-chain configuration, [9-1](#)
Data Highway/Data Highway Interface Plus
 Module. See KA module, [v](#)
data transmission rate, PLC interface
 module, [8-3](#)
DH+ Interface Board (1784-KT,-KTK1),
 [5-1](#)
dimensions, [B-1](#)
 1771-A3B 12-slot I/O chassis with power
 supply, [B-13](#)
 1771-A3B 16-slot I/O chassis with power
 supply, [B-13](#)
 1771-A3B1 12-slot I/O chassis with
 power supply, [B-12](#)
 1771-A3B1 16-slot I/O chassis with
 power supply, [B-12](#)
 4-port distribution panel, [B-2](#)
 4-slot chassis, [B-2](#), [B-12](#), [B-13](#)
 8-slot chassis, [B-1](#), [B-12](#), [B-13](#)
 black and white monitor (12"), [B-8](#)
 black and white monitor (9"), [B-9](#)
 camera, [B-11](#)
 color monitor, [B-10](#)
 fan assembly, [B-1](#)
 I/O board, [B-8](#)
 I/O interface box, [B-6](#)
 industrial disk, [B-3](#)
 user interface box, [B-4](#)
direct communication module switches,
 [8-2](#)
disposal of, lithium battery, [4-2](#)

E

EI module
 check LEDs, [11-7](#)
 illustration, [1-5](#)
 installing, [4-24](#)
 jumper settings, checking, [4-26](#)
 replacing, [4-24](#)
 start up and configure, [D-1](#)
electrostatic damage, [4-1](#)
electrostatic discharge, [1-2](#)
emergencies, lithium battery, [4-3](#)
error codes, [12-6](#), [12-7](#), [12-8](#)
errors, [12-5](#)
Ethernet address, [12-10](#)

Ethernet heartbeat, [4-25](#)

Ethernet Interface module. See EI module, [1-5](#)

extended-local I/O

 cable lengths, [9-5](#)

 installing link, [7-7](#)

 link termination, [9-6](#)

 making connections, [9-5](#)

F

fan assembly, [1-3](#)

 ac input ranges, [10-4](#)

 connecting, [4-6](#)

 connection, ac power, [10-4](#)

 dimensions, [B-1](#)

 mounting, [2-8](#)

filler plates

 illustration, [1-5](#)

 installation, [4-5](#)

 installing, [A-10](#)

format

 industrial disk (for 5730-CPU1), [12-12](#)

 industrial disk (for 5731-CPU1, -CPU2),
 [12-16](#)

full duplex, [C-11](#)

G

grounding, [3-1](#), [10-1](#)

 conductors, [3-2](#)

 PI components, [3-1](#)

 static-safe environment, [A-1](#)

 tools, [3-1](#)

 wires, [3-3](#)

H

half duplex, [C-11](#)

hardware, checking, [11-1](#)

I

I/O, [8-1](#), [8-6](#)

 board

 connection, [6-6](#)

 dimensions, [B-8](#)

 chassis, configuration jumper, [7-3](#)

 checking, [11-7](#)

 connecting, [4-17](#)

 group, [7-6](#)

 group number, [7-7](#)

 installation, [7-1](#)

 installation tools, [7-1](#)

 installing, [7-1](#)

 interface box, [2-11](#)

 connection to CVIM module, [6-2](#)

 dimensions, [B-6](#)

 keying bands, [7-11](#)

 link, [9-1](#)

 configuration, [9-1](#)

 medium, [9-1](#)

 to a 1771-AM1, -AM2, [9-7](#)

 to a 1771-ASB adapter, [9-3](#)

 to a 1785 PLC-5 controller, [9-7](#)

 to a direct communication module,
 [9-8](#)

 to a PanelView Operator terminal,
 [9-10](#)

 to a PLC interface module, [9-9](#)

 to a RediPANEL module, [9-8](#)

 power supply, [10-4](#)

 rack, [7-7](#)

 remote, [6-1](#)

 connection, [6-7](#)

 standard 1771, [7-1](#)

important information

 chassis, grounding stud, [3-1](#)

 formatting procedure, [12-16](#)

 grounding, [10-3](#)

 lithium batteries, [4-2](#)

 memory board (DH/DH+), [4-8](#)

 non Allen-Bradley publications, [4-31](#)

 OSI interface module, switches, [4-27](#)

 powering up modules, [4-27](#)

 replacing EI module, [4-24](#)

 replacing MicroVAX Information

 Processor, [4-24](#)

 scrapping, [3-4](#)

 seating, [A-6](#)

indicator lights, checking, [11-1](#)

industrial disk, [1-9](#), [10-3](#), [12-1](#)

 ac power, wiring, [5-5](#)

 check LEDs, [11-9](#), [11-10](#)

 completing installation, [5-2](#)

 connection

 ac power, [10-3](#)

 MicroVAX Information Processor, [5-6](#)

 second disk, [5-7](#)

 dimensions, [B-3](#)

 operating voltage, [5-3](#)

industrial terminal, connection, [5-1](#)

installing

 1771 I/O, [7-1](#)

 connecting cables, [7-17](#)

 CVIM module, [4-20](#)

 EI, [4-24](#)

 LP, [4-18](#)

memory module, [A-4](#)
 MicroVAX Information Processor, [4-21](#)
 module in the chassis, [A-1](#), [A-5](#)
 non-standard I/O, [8-1](#)
 OSI interface, [4-32](#)
 peripherals, [5-1](#)
 prepare for, [1-1](#)
 RS, [4-15](#)
 interface box, dimensions, [B-6](#)

K

KA module, [iv](#), [v](#)
 address, [4-12](#)
 cable pinouts for ports, [C-4](#)
 check LEDs, [11-6](#), [11-7](#)
 connections, [4-12](#)
 illustration, [1-5](#)
 installation, [4-8](#)
 ports 2A and 2B, [C-3](#)
 setting switches and jumpers, [4-8](#)
 keying bands, [7-11](#), [11-7](#)

L

LEDs, checking, [11-1](#)
 light pen, connection, user interface box, [6-5](#)
 lithium battery
 disposal of, [4-2](#)
 emergencies, [4-3](#)
 exposed, [4-4](#)
 fire, [4-4](#)
 leaking, [4-4](#)
 overheated battery, [4-3](#)
 personnel protection, [4-3](#)
 storing, [4-3](#)
 local scanner. See RS5, [1-4](#)
 logic processor, [v](#)
 logic processor. See LP, [1-4](#)
 LP
 battery holder, [4-18](#)
 changing a memory module, [A-1](#)
 check LEDs, [11-5](#)
 disposal of battery, [4-1](#)
 illustration, [1-4](#)
 installing, [4-18](#)
 module address, [4-18](#)
 processor input interrupts, [4-19](#)
 start up and configure, [D-1](#)

M

MAP, [1-7](#), [4-30](#)

MAP Station Manager, [4-28](#), [4-33](#)
 MicroVAX Information Processor
 battery holder, [4-22](#)
 change modes and boot module, [12-3](#)
 check LEDs, [11-5](#), [11-6](#)
 checking, module indicator lights, [12-2](#)
 configuring hardware, [12-1](#)
 connection
 industrial disk, [5-6](#)
 program loader, [5-9](#)
 disposal of battery, [4-1](#)
 Ethernet address, [12-10](#)
 Ethernet connection, [4-23](#)
 hardware, [12-1](#)
 hardware defaults, [12-17](#)
 illustration, [1-6](#)
 individual device self-test, [12-6](#)
 installation, [4-21](#)
 keyswitch, [4-22](#), [12-3](#)
 modes, [12-3](#)
 power-up self-test, [12-4](#)
 replacing, [4-21](#), [4-24](#)
 run power-up diagnostics, [12-3](#)
 set up console terminal for, [12-2](#)
 setting default recovery, [12-18](#)
 start up and configure, [D-1](#)
 start up and configure software, [D-6](#)
 start up and test, [12-1](#)
 system configuration table, [12-7](#)
 system exerciser, [12-10](#)
 MicroVAX Information Processor module,
 abbreviations, [v](#)
 modems
 cable pinouts, [C-5](#)
 full duplex, [C-11](#)
 half duplex, [C-11](#)
 modes, changing, [12-3](#)
 modules, [1-4](#), [1-5](#), [1-6](#), [1-7](#)
 checking, [11-3](#)
 memory, [A-2](#), [A-4](#)
 packing material, [4-5](#)
 weights, [1-10](#)
 monitor. See either black and white monitor
 or color monitor, [6-4](#)
 mounting, [2-1](#)
 black and white monitor
 (2801-N8,-N9,-N20), [2-11](#)
 camera, [2-10](#)
 chassis, [2-2](#)
 fan assembly, [2-8](#)
 I/O board (1771-JMB), [2-11](#)
 I/O interface box (2801-N22), [2-11](#)
 panel mount, [2-5](#)
 rack mounting, [2-2](#)
 tools, [2-2](#)

user interface box (2801–N21), [2-11](#)

N

no handshaking, null-modem cables, [C-11](#)

non-standard I/O, installing, [8-1](#)

null-modem cables

no handshaking, [C-11](#)

pinouts, [C-11](#)

O

Open Systems Interconnect (OSI) Interface
Module or Cx. See OSI interface
module, [v](#)

OSI interface module

(Cx), [v](#)

battery holder, [4-27](#)

cabling specifications

(broadband/carrierband port), [4-30](#)

check LEDs, [11-6](#)

communication defaults, [4-26](#)

communication ports, (illustration), [4-31](#)

configurable parameters, [4-32](#)

connecting a device, [4-30](#)

connecting the module, [4-28](#)

disposal of battery, [4-1](#)

documentation, [4-31](#)

illustration, [1-7](#)

installing, [4-27](#), [4-32](#)

modes, [4-33](#)

operating modes, [4-26](#)

RS-232 port, [4-29](#)

setting switches, [4-26](#)

setting the pushwheel address, [4-28](#)

slot times, [4-32](#)

specifying switch settings, [4-33](#)

start up and configure, [D-1](#)

software, [D-8](#)

system load, [4-32](#)

OTW. See overtemperature warning (OTW),
wiring, [5-4](#)

P

panel mounting, [2-5](#)

peripherals

check LEDs, [11-10](#)

installation, [5-1](#)

pin assignments, RS-232 connector, OSI
interface module, [4-29](#)

PLC interface module, [8-3](#)

PLC-5/250 processor, start up and
configure, [D-1](#)

power interlock relay, [10-2](#)

power supply, [1-4](#), [10-2](#)

connection

ac power, [10-3](#)

power interlock relay, [10-2](#)

connection to fan assembly, [4-6](#)

I/O, [10-4](#)

installation, [4-5](#)

operating voltage, [4-5](#)

outside chassis, [7-3](#)

specifications, [4-5](#)

processor input interrupts (PII), [4-19](#)

program loader, [1-9](#)

connecting, [12-2](#)

connection, MicroVAX Information
Processor, [5-9](#)

R

rack mounting, [2-2](#)

RediPANEL Keypad

module switches, [8-6](#)

push-button switches, [8-6](#)

related publications, [v](#)

remote I/O, CVIM module link connection,
[6-1](#), [6-7](#)

Remote I/O link, connecting, [9-1](#)

remote scanner, [v](#)

remote scanner. See RS2, [1-4](#)

remote/local scanner. See RS, [1-4](#)

removing

memory module from the chassis, [A-2](#)

module from the chassis, [A-1](#), [A-8](#)

replacing

EI module, [4-24](#)

MicroVAX Information Processor, [4-21](#),
[4-24](#)

resource manager, [v](#)

resource manager. See RM, [1-4](#)

RM

battery holder, [4-11](#)

cable pinouts for ports, [C-4](#)

changing a memory module, [A-1](#)

check LEDs, [11-4](#), [11-7](#)

connections, [4-12](#)

DH/DH+, [4-15](#)

industrial terminal, IBM AT or XT
compatible, [5-1](#)

port 2A and 2B pinouts, [C-4](#)

RS-232, RS-422, RS-423 devices,
[4-12](#)

disposal of battery, [4-1](#)

- illustration, [1-4](#)
 - installation, [4-8](#)
 - keyswitch, [4-15](#)
 - ports 2A and 2B, [C-3](#)
 - setting switches and jumpers, [4-8](#)
 - RS, [9-1](#)
 - 150-Ohm termination resistor, [9-2](#)
 - battery holder, [4-17](#)
 - connecting I/O link cable, [9-2](#)
 - disposal of battery, [4-1](#)
 - grounding, [9-2](#)
 - illustration, [1-4](#)
 - installing, [4-15](#)
 - module address, [4-17](#)
 - start up and configure, [D-1](#)
 - termination resistors, [4-15](#)
 - RS-232, [4-8](#), [4-12](#)
 - pin assignments, [4-13](#)
 - OSI interface module, [4-29](#)
 - RS-422, [4-12](#)
 - pin assignments, [4-13](#)
 - RS-423, [4-12](#)
 - pin assignments, [4-14](#)
 - RS2
 - changing a memory module, [A-1](#)
 - check LEDs, [11-4](#)
 - RS5, check LEDs, [11-5](#)
 - run
 - MicroVAX Information Processor,
 - self-test, [12-6](#), [12-7](#)
 - power-up diagnostic self-test, [12-3](#)
 - self-test on individual devices, [12-6](#)
- ## S
- scanner. See RS, [1-4](#)
 - self-test error codes, table of, [12-8](#)
 - serial port
 - 25-pin, [C-4](#)
 - 9-pin, [C-3](#)
 - set
 - default boot device, [12-17](#)
 - default recovery, [12-18](#)
 - hardware defaults, [12-17](#)
 - pushwheel address, OSI interface module, [4-28](#)
 - switches, OSI interface module, [4-26](#)
 - set up, console terminal, MicroVAX Information Processor, [12-2](#)
 - software
 - MAP Station Manager, [4-28](#), [4-33](#)
 - MicroVAX Information Processor, start up and configure, [D-6](#)
 - OSI interface module, start up and configure, [D-8](#)
 - specifications, power supply, [4-5](#)
 - start up and test MicroVAX Information Processor, [12-1](#)
 - configure defaults, [12-1](#)
 - perform power-up diagnostics, [12-1](#)
 - run system exerciser, [12-1](#)
 - set up terminal, [12-1](#)
 - verify industrial disk, [12-1](#)
 - static-safe environment, [1-2](#), [4-1](#)
 - storing, lithium battery, [4-3](#)
 - switch assemblies, SW1, extended-local I/O, [7-7](#)
 - switch settings, [C-2](#)
 - extended-local I/O adapter module, [7-7](#)
 - switches
 - conventions, [8-1](#)
 - direct communication module switches, [8-2](#)
 - PLC interface module, [8-3](#)
 - RediPANEL, [8-6](#)
 - RediPANEL Keypad module, [8-6](#)
 - settings, 1770-KF2, 1785-KE, [C-2](#)
 - system exerciser display codes, table of, [12-12](#)
- ## T
- table
 - hardware self-test error codes, [12-8](#)
 - system exerciser display codes, [12-12](#)
 - test device numbers, [12-6](#)
 - test numbers, device mnemonics, [12-6](#)
 - terminating link, extended-local I/O, [9-6](#)
 - termination resistors, [9-8](#)
 - 150-Ohm, [9-2](#)
 - extended-local I/O, [9-6](#)
 - transformers, [10-1](#)
 - transmission rate, [C-3](#)
 - trunkline/dropline configuration, [9-1](#)
- ## U
- user interface box
 - connection
 - black and white monitor, [6-4](#)
 - color monitor, [6-4](#)

CVIM module, [6-3](#)
light pen, [6-5](#)
dimensions, [B-4](#)

I/O board, [1-8](#)
monitor, [1-8](#)
user interface box, [1-8](#)

V

verify
 industrial disk, [12-1](#)
 industrial disk (for 5730-CPU1), [12-12](#)
vision components
 camera, [1-8](#)
 completing installation, [6-1](#)

W

wiring, [10-3](#)
 ac, [10-1](#)
 industrial disk, [5-5](#)
 module connectors, [A-11](#)
 terminal strip, [6-6](#)
 warning device, [5-5](#)



Allen-Bradley, a Rockwell Automation Business, has been helping its customers improve productivity and quality for more than 90 years. We design, manufacture and support a broad range of automation products worldwide. They include logic processors, power and motion control devices, operator interfaces, sensors and a variety of software. Rockwell is one of the worlds leading technology companies.

Worldwide representation.



Argentina • Australia • Austria • Bahrain • Belgium • Brazil • Bulgaria • Canada • Chile • China, PRC • Colombia • Costa Rica • Croatia • Cyprus • Czech Republic • Denmark • Ecuador • Egypt • El Salvador • Finland • France • Germany • Greece • Guatemala • Honduras • Hong Kong • Hungary • Iceland • India • Indonesia • Ireland • Israel • Italy • Jamaica • Japan • Jordan • Korea • Kuwait • Lebanon • Malaysia • Mexico • Netherlands • New Zealand • Norway • Pakistan • Peru • Philippines • Poland • Portugal • Puerto Rico • Qatar • Romania • Russia-CIS • Saudi Arabia • Singapore • Slovakia • Slovenia • South Africa, Republic • Spain • Sweden • Switzerland • Taiwan • Thailand • Turkey • United Arab Emirates • United Kingdom • United States • Uruguay • Venezuela • Yugoslavia

Allen-Bradley Headquarters, 1201 South Second Street, Milwaukee, WI 53204 USA, Tel: (1) 414 382-2000 Fax: (1) 414 382-4444